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Poteau River Basin

in Oklahoma and Arkansas

A Report on the Water and Related Land Resources

Prepared by
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
ECONOMIC RESEARCH SERVICE
1966

Cover picture shows Cedar Lake operated as a recreational site by the U. S. Forest Service (U. S. Forest Service Photo)

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UNITED STATES DEPARTMENT OF AGRICULTURE
Field Advisory Committee
Poteau River Basin

Stillwater, Oklahoma
March 1, 1967

The Reverend John E. Evans, President
Poteau River Watershed Council
Rural Route #1
Heavener, Oklahoma

Dr. Lloyd Church, Vice President
Poteau River Watershed Council
Wilburton, Oklahoma

Gentlemen:

The attached report by the United States Department of Agriculture presents information regarding opportunities for the development of the water and related land resources of the Poteau River Basin in Oklahoma and Arkansas. The studies and investigations were coordinated with a study of the Tulsa District of the Corps of Engineers, Department of the Army.

At the request of the Poteau River Basin Council, this study was made under the provisions of Section 6, Public Law 566, 83rd Congress, as amended and supplemented. The agencies participating in this study within the United States Department of Agriculture were the Forest Service, Economic Research Service, and the Soil Conservation Service. The study and investigations were fully coordinated with other Federal and State agencies.

It is hoped that this report will furnish guidance for the orderly and complete development of all of the water and related land resources in the Poteau River Basin.

Very truly yours,

C. A. Tidwell

C. A. Tidwell
State Conservationist
Soil Conservation Service

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-Nathan Mallett, Economic Research Service-
Little Rock, Arkansas - Member

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REPORT ON THE WATER AND RELATED LAND RESOURCES IN THE POTEAU RIVER BASIN IN OKLAHOMA AND ARKANSAS

Prepared under the Authority of Section 6 of the
Watershed Protection and Flood Prevention Act
(Public Law 566, 83rd Congress;
68 Stat. 666), as Amended

Prepared by

U. S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Forest Service
Economic Research Service

1966

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U.S. DEPARTMENT OF AGRICULTURE

POTEAU RIVER BASIN, OKLAHOMA AND ARKANSAS

SUMMARY

This report by the U.S. Department of Agriculture is part of a comprehensive plan for development of the water and related land resources of the Poteau River Basin in Oklahoma and Arkansas. It is based on the USDA part of a coordinated study and investigation with the Department of Army Corps of Engineers. The programs of the two departments were developed concurrently and will complement each other, and both will be needed for realization of full benefits for the resource development plans. However, either program will operate alone and make an important contribution toward solving the Basin problems.

The Poteau River Basin Council requested the study by the Department of Agriculture under the provisions of Section 6 of Public Law 566, 83rd Congress, as amended and supplemented. The agencies participating in the study within the Department of Agriculture are the Soil Conservation Service, the Forest Service, and the Economic Research Service. The study and investigation was fully coordinated with other State and Federal agencies to consider the related activities of each in developing the water and related land resources.

OBJECTIVE AND SCOPE OF STUDY

The objectives of the studies were to determine the elements of a comprehensive plan for coordinated and orderly development of the water and related land resources. This would include the determination of the most efficient system of land treatment and structural measures, to solve the problems in the Basin relating to erosion control, flood prevention, water management, fish and wildlife, and recreation at a justifiable cost. Programs formulated by USDA for these purposes will promote economic growth and development which are consistent with overall national objectives.

Land management and land treatment measures are interrelated with upstream and downstream measures as a means of achieving optimum development of the area's natural resources.

The studies and investigations of the agencies of the USDA were made in close association and fully coordinated with the Corps of Engineers' studies to assure that the findings and recommendations of the two departments would harmonize. Guidelines were developed to equitably distribute the benefits on the Poteau River main stem flood plain lands attributable to the projects of each department.

GENERAL DESCRIPTION OF THE BASIN

The total area of the Basin is 1,208,320 acres, or 1,888 square miles. The population in 1965 was 44,000, and the projections to the year 2020 indicate

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a population of 88,000. Elevations range from 400 to more than 2,500 feet. Average annual precipitation is from 40 to 45 inches, with 32 percent on the average occurring in April, May, and June. The length of the growing season is about 220 days, extending from the last of March to the first of November.

Seventy-eight percent of the land is privately owned and 22 percent is publicly owned. Approximately 11 percent is used for crop production, 16 percent for range and pasture, 68 percent is forest, and 5 percent is in miscellaneous use.

This area is served by 266 miles of railroads and 257 miles of State and Federal highways. These furnish adequate transportation to markets outside the Basin.

PROBLEMS AND NEEDS

Flooding of the tributary and main stem flood plain lands has seriously curtailed agricultural production to the extent that it has affected the total economy of the Basin.

Erosion on the upland is not a serious problem. The chief source of sediment is from sheet erosion from formerly cultivated land, from steep mountainous areas with insufficient cover, and from burned-over pastures and woodlands.

There is little irrigation in the Basin at the present time. Future irrigation development will be limited by the availability of suitable land and the cost of irrigation water supply storage.

There are approximately 111,300 acres of bottomland soils, with 24 percent having a major problem of excessive wetness. The agricultural management needs are being met under Public Law 46 programs.

Two-thirds of the Basin is in forest cover, with practically all this area capable of growing timber of commercial quality. National Forest lands (about 26 percent of the commercial forest lands) include almost three-fourths of the pine-type acreage and over four-fifths of the sawtimber acreage. In contrast a greater part of the hardwood inventory is on private ownership, amounting to 82 percent of the board foot volume and 85 percent of the growing stock. On the National Forest lands the current inventory averages about 40 percent of optimum productivity. Nearly all the privately owned forest land has a history of abuse from poor cutting practices, fires, and overgrazing and is producing only about one-sixth of the long-term capability. Most of these ownerships are too small for efficient, profitable management on an individual basis.

Many of the towns and communities have inadequate water supply, which was one impediment to their growth and development. Most of the towns which depend on water from underground sources have summer seasonal water shortages with conditions becoming serious during drought years.

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Water supplies for fish and wildlife and for recreational use generally are inadequate during summer months and during drought conditions.

FINDINGS AND CONCLUSIONS

Economy as Related to Agriculture

The average annual precipitation ranges from 40 to 45 inches, with an average runoff from 13.7 to 15.3 inches. The annual yield to surface streams is estimated at 1,410,000 acre-feet, which indicates there is not a shortage of water, only that the distribution is poor.

The agricultural sector of the economy has declined relatively as a source of income. During the 30 years between 1930 and 1959, the number of farms was more than halved and the average size of farms more than doubled. Livestock and livestock products are contributing the major portion to the agricultural economy, and the trend is expected to continue. The increase in the size of farms and technological advances has resulted in higher incomes for many farm families; however, there are numerous farm owners (with small holdings) and tenants in need of supplemental incomes.

The Oklahoma portion of the Basin located in LeFlore, Latimer, and Haskell counties has not kept pace with the remainder of the State in economic growth and change. In 1959 these counties had an average median family farm income of less than $2,600. This is 56 percent of the State and 46 percent of the national median. The counties with the lowest median family incomes are the same counties that rank the highest in percentage of population receiving welfare payments. In 1960, 16 to 20 percent of the total civilian population in these three counties was receiving public assistance.

The future growth of the Basin economy is dependent on agriculture, forest products, industry, tourism, recreational enterprises, and service industries. Fort Smith, Arkansas, a city of 65,000, lies partly in the lower reaches of the Basin. Many of the residents in commuting distance are employed in this area. There is a need for additional employment in other areas to supplement incomes which will raise their standards of living.

Solution Through USDA Programs

The objectives of the land treatment program are to provide for optimum utilization in order to satisfy current needs and at the same time to conserve the land, water, and related resources for the use of future generations. These practices are especially important for protection of the upland areas to support and supplement both upstream and downstream structural measures. The estimated cost of applying the land treatment measures needed in the next 10 to 15 years is estimated to be $11,500,000.

Plans for works of improvement for flood prevention and water management, through project action under authority of Public Law 566, have been approved for the Poteau River and the Fourche Maline and Caston-Mountain Creek watersheds. Four other watersheds in the Basin are feasible under Public Law 566 criteria and are proposed as projects. These are Black Fork Creek, Combined Creeks, James Fork Creek, and Brazil Creek.

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The proposed projects include 36 structures to meet the needs of the upstream areas. These include 18 single-purpose structures for flood prevention and 18 multipurpose structures. Of the latter, in addition to flood prevention storage, 3 have fish and wildlife, 8 have recreation, 6 have municipal water supply, and 1 structure has recreation and municipal storage.

Proposed multipurpose structures are located near all the towns and communities in the Basin which have critical water supply shortages.

Pressures for recreational opportunities can be met to a large extent by increasing facilities in the Ouachita National Forest and expanding the State parks. There is opportunity for income-producing recreational enterprises to be developed within the next 10 to 15 years by farmers and ranchers on rural land. Recreational facilities at the proposed multipurpose structures also will provide recreational use. It is estimated that the use of these facilities will provide as much as half a million visitor-days annually.

The cost of structures included in Public Law 566 work plans which have been approved was estimated at eleven million. The structural measures included in the proposed projects are estimated to cost 9.6 million. Annual cost including operation and maintenance was estimated to be about $400,000. The average annual estimated benefits amount to approximately $520,000, and the benefit-cost ratio is 1.3:1.

Development of Full Resource Potential

Holston-Reichert-Conser Creeks, Poteau and Heavener Laterals, and Spiro and Bonanza Laterals are additional watersheds needing project action to fully develop the land and water resource potentials. The structural needs are: Holston-Reichert-Conser, 3; Poteau and Heavener Laterals, 6; and Spiro and Bonanza Laterals, 3. The structural needs of other watersheds to develop the full water resource potential are: Poteau River, 4; Black Fork Creek, 4; Fourche-Maline, 3; Combined Creeks, 1; and Brazil Creek, 1.

Impacts

It is estimated that the average annual damages resulting from flooding of tributary flood plain lands in feasible projects will be reduced by almost 83 percent by the installation of the proposed upstream structural measures. In addition, damages on the Poteau River main stem flood plain will be reduced significantly. Land treatment practices will reduce damages an additional estimated 4 to 5 percent.

At the present time the agricultural income, excluding national forest timber sales, is estimated to be $9,125,000. By 1980, with the proposed project installed, the income is predicted to be $12,000,000 and by the year 2020 will be near $19,000,000.

Establishing land treatment practices, improved management, and conservation measures will increase crop yields, livestock production, and forest products. The development of the planned and potential Public Law 566 projects

will make significant contributions to the economic and social well-being of the people in the area and, in general, will improve the public welfare.

There will be increased efficiency in the use of factors of production brought about by taking marginal upland out of crop production and by reducing the hazards of frequent flooding on bottomland areas. The proposed projects will provide increased stability of family farms through more efficient operations, reduced costs, and increased net returns. With proper use and development, the agricultural and forested lands will provide an increasing supply of wood, water, fiber, forage, and recreational benefits.

In any development program, "people" must be recognized as the dominant factor. The rate of implementation and the success in the development of the water and related land resources in the Poteau River Basin will depend on the initiative and cooperation of local interest. The purposes of the USDA programs and projects are to improve and accelerate the growth of the economy. The ultimate objective must be a better standard of living for people, both farm and nonfarm.

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INTRODUCTION

This report by the U.S. Department of Agriculture is part of a comprehensive plan for development, utilization, and management of the water and related land resources of the Poteau River Basin in Oklahoma and Arkansas. It is based on the studies made by the agencies in the USDA coordinated with studies made by the Department of the Army Corps of Engineers. The investigations and studies of the two departments were fully coordinated to insure that the formulation of plans and programs to develop the water and the related land resources of the Basin are harmonized.

The Corps of Engineers' study was authorized by a resolution adopted January 28, 1955, by the Public Works Committee of the United States Senate and by a resolution adopted August 15, 1961, by the Committee on Public Works, United States House of Representatives.

The Department of Agriculture participated in the study, at the request of the Poteau River Basin Council, under provisions of Section 6 of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, as amended), which authorized the Secretary of Agriculture to cooperate with other Federal, State, and local agencies in surveys and investigations of the watersheds of rivers and other waterways to develop coordinated programs. The agencies involved, within the Department of Agriculture, in carrying out the study were the Soil Conservation Service, Forest Service, and Economic Research Service. Consultations were made with other Federal, State, and local agencies to insure full consideration of all views and requirements for developing the resources of the Basin.

OBJECTIVES, SCOPE, AND EXPECTED RESULTS

The purpose of the Department of Agriculture participating in the study was to: (1) consider both the present and the projected needs for erosion control, flood prevention, water management, fish and wildlife, and recreation; (2) evaluate the capabilities and potentials of meeting the water and related land resource needs; (3) examine the broad economic aspect of the possible water resource developments; and (4) contribute to a comprehensive plan for coordinated and orderly development, management, and use of water and related land resources of the Basin.

In addition, the Department of Agriculture evaluated the agricultural and nonagricultural damages caused by floodwater, scour, and sediment to the flood plain lands. Appraisals were made on the land use and the land treatment practices as they relate to soils, erosion, and the use of land within its capabilities.

The scope of the study includes an inventory of the water and related land resource problems and the present and future needs for development. Consideration was given to upstream structural measures closely integrated with downstream developments and a pattern of land use and land treatment whereby the needs of the Basin are effectively satisfied.

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The objectives of the investigation and the study were to:

1. Determine an interrelated system of upstream structural measures for water resource development that will alleviate flood and agricultural management problems at a justifiable cost.

2. Identify and determine the extent to which USDA programs can contribute to the solution of water and related land use problems with emphasis on project-type possibilities. Consideration would be given to the developments which would satisfy the needs and could be implemented by existing enabling legislation and to point out the need for additional authorities.

3. Consider those land and water resource projects which would contribute significantly to the development of economically depressed rural areas.

4. Evaluate the economic impacts resulting from the proposed programs considering the projected 1980 and 2020 agricultural land use changes.

5. Develop procedures in conjunction with the Corps of Engineers to equitably distribute project and program benefits attributable to works of improvement from the main stem flood plain lands to the projects of each department.

HISTORY OF THE POTEAU RIVER BASIN STUDIES

In the latter part of the 1940's, the Soil Conservation Service and Forest Service made a study of the Lower Arkansas River watershed. The study area includes the drainage of the Arkansas River below the confluence of the Cimarron River near Tulsa, Oklahoma, with the exception of the drainage areas of the Canadian, Verdigris, and Grand (Neosho) rivers. The Poteau River Basin was included in the study area.

The Arkansas-White-Red (AWR) Basin, Inter-Agency Committee, published a report in 1955. The Basin is included in the area covered by the report.

The Poteau River Basin Council of the soil conservation districts of eastern Oklahoma and western Arkansas was organized on July 28, 1953. At this meeting the Council was formed, officers were elected, and the construction and by-laws were adopted. The Council is composed of representatives from the Poteau River, Sebastian County, Haskell County, LeFlore County, and Latimer County Soil and Water Conservation districts. Annual meetings have been held by the Council since it was organized.

The purpose of the Council was to promote the upstream agricultural flood prevention program in eastern Oklahoma and western Arkansas; to provide a central point of contact between the various soil conservation districts in the Basin and any State and Federal agency participating in this program; and to integrate the various phases of the program throughout the Basin watershed and to coordinate this work with the operation of Wister Reservoir.

Another function of the Council was to cosponsor applications for assistance in planning and carrying out works of improvement under Public Law 566.

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COORDINATION OF USDA AGENCIES, OTHER FEDERAL AND STATE AGENCIES, AND LOCAL ORGANIZATIONS

The study and investigations were made by the agencies in the U.S. Department of Agriculture under the direction of a Field Advisory Committee, composed of representatives of the Soil Conservation Service, Forest Service, and Economic Research Service, with the SCS representative as the chairman. The FAC furnished guidance in scheduling USDA survey and investigation activities and coordinated the cooperative study with the Corps of Engineers and other Federal and State agencies. The committee met at intervals to review planning procedures, effect agency coordination, arrange for necessary consultation, and determine progress being made in the study and investigation. This report was prepared under the direction of the Field Advisory Committee.

ACKNOWLEDGMENTS

Several agencies and organizations furnished helpful assistance in the study and investigation. The field offices of the Soil Conservation Service and the Forest Service furnished valuable information relating to soils, land use, and land treatment. The County Extension Service, Farmers Home Administration, and the Agricultural Stabilization Conservation Service assisted in furnishing agricultural information. Recreational data and recommendations were furnished by the Bureau of Sport Fisheries and Wildlife and the Oklahoma Wildlife Conservation Department.

Several State and Federal agencies, in addition to the U.S. Department of Agriculture, have provided data and helpful assistance for this report. Chief contributors are the United States Bureau of Indian Affairs, Bureau of Reclamation, Bureau of Mines, Bureau of the Census, Statistical Reporting Service, Geological Survey, Weather Bureau, and the Public Health Service; the Oklahoma Water Resources Board, Department of Highways, Division of State Parks, Division of Forestry, and the Planning and Resources Board; the Arkansas Forestry Commission and the State Game and Fish Commission; and the following Soil and Water Conservation districts: LeFlore County, Latimer County, Haskell County, Sebastian County, Poteau River, and Rich Mountain.

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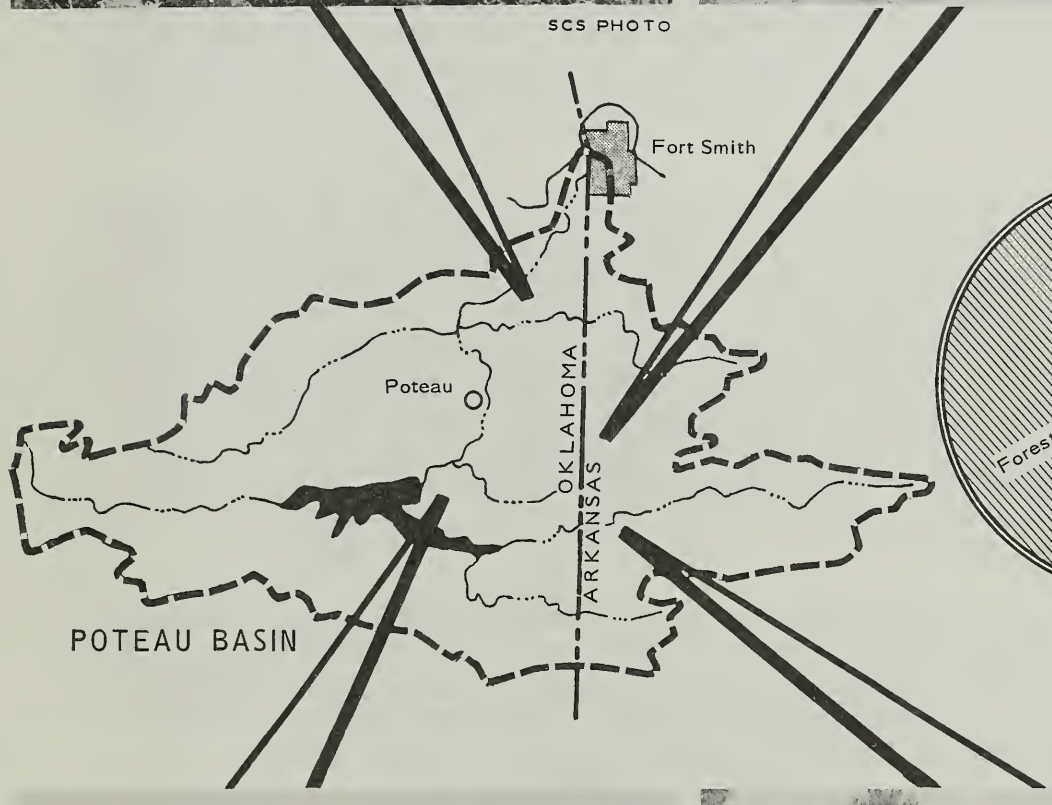

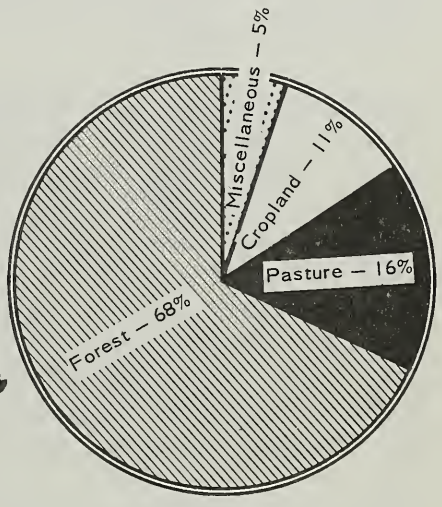

LAND USE

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I. DESCRIPTION OF THE BASIN

LOCATION AND SIZE

The Poteau River Basin is located in eastern Oklahoma and western Arkansas and has a total area of 1,208,320 acres or 1,888 square miles. The Oklahoma portion includes most of LeFlore County, a part of Latimer County, and a minor portion of Haskell County. The areas in Arkansas are located in parts of Sebastian and Scott counties and a minor part of Polk County.

The Basin population in 1965 was estimated at about 44,000 people. Seventy-eight percent is privately owned, and 22 percent is publicly owned. Eleven percent is cropland, 16 percent is pasture and range, 68 percent is forest, and 5 percent is devoted to miscellaneous uses. The Basin lies near the western edge of the commercial timber belt for eastern United States. Its topography ranges from gently rolling in the lower reaches to mountainous in the upper reaches.

Wister Reservoir, a Corps of Engineers project, is located in the central part of the Basin. The dam for this reservoir was located on the Poteau River downstream from the mouth of Fourche Maline Creek. The drainage area of the reservoir is 993 square miles or 53 percent of the Basin total. The Upper Poteau River, Black Fork, Holston, and Fourche Maline creeks are the main tributaries above Lake Wister. The principal tributaries below the reservoir are Morris, Sugarloaf, James Fork, and Mills creeks on the east side of the Poteau River, with Caston-Mountain and Brazil creeks on the west side. The drainage of the Poteau River is generally to the north. The width of the Basin through the main body is 85 miles, and the overall length is 50 miles.

The U.S. Department of Agriculture study includes an evaluation and investigation of each tributary watershed and of the main stem flood plain of the Poteau River. The Poteau River Basin Map, plate 1, shows the location and total acreage of the tributary watersheds and the study areas. Table 1 includes a list of the watersheds with the acreage in each county.

Tributary Watersheds

Eight applications have been received on tributary watersheds in the Basin under the Watershed Protection and Flood Prevention Act (Public Law 566) for the reduction of floodwater and sediment damages and for the conservation, development, and utilization of water resources. Three of these watersheds have been authorized for construction as Public Law 566 projects.

Study Areas

The remaining areas, not included in the eight watersheds on which applications have been made for Public Law 566 assistance, were placed in three study areas. Two of these are lateral-type watersheds, one in the vicinity of Poteau and Heavener, Oklahoma, and the other includes the area around Spiro, Oklahoma, and Bonanza, Arkansas. The remaining study area is the main stem flood plain from the Wister Reservoir downstream to the confluence

LEGEND

No.	Creek Watershed	Drainage Area	Counties
1	Poteau River (P. L. 566 Work Plan)	187,460	Scott (Ark.) LeFlore (Okla.)
2	Black Fork Creek	133,414	Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3	Holsten-Reichert-Conser	97,792	LeFlore (Okla.)
4	Fourche Maline Creek (P. L. 566 Work Plan)	175,360	Latimer, LeFlore (Okla.)
5	Caston-Mountain Creek (P. L. 566 Work Plan)	47,853	LeFlore (Okla.)
6	Combined Creeks	118,272	Sebastian (Ark.) LeFlore (Okla.)
7	James Fork Creek	138,975	Sebastian (Ark.) LeFlore (Okla.)
8	Brazil Creek	152,100	Haskell, Latimer, LeFlore (Okla.)
9	Poteau and Heavener Laterals	62,740	LeFlore and Latimer (Okla.)
10	Spiro and Bonanza Laterals	52,154	Sebastian (Ark.), LeFlore (Okla.)
	Main Stem Flood Plain	42,200	LeFlore (Okla.)
	Totals	1,208,320	

LEGEND

- Paved Road
- Railroad
- County Line
- State Line
- Drainage
- Town or Community
- Watershed Boundary
- Sub-watershed Boundary
- 3 Watershed Number
- Ouachita National Forest Boundary

STATE OF OKLAHOMA

STATE OF ARKANSAS

OKLAHOMA ARKANSAS

Plate I

POTEAU RIVER BASIN

OKLAHOMA AND ARKANSAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER, OKLAHOMA

Rev. 1-67 Revised 4-65 Base 4-R-10040

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Table 1 - Tributary Watersheds Acreage by Counties and States
Poteau River Basin, in Oklahoma and Arkansas

Watersheds	Oklahoma			Arkansas			Total
	LeFlore	Latimer	Haskell	Sebastian	Scott	Polk	
1. Upper Poteau River	11,330	-	-	-	176,130	-	187,460
2. Black Fork Creek	91,760	-	-	-	30,590	11,064	133,414
3. Holston-Reichert Conser Creeks	97,792	-	-	-	-	-	97,792
4. Fourche Maline Creek	26,216	149,144	-	-	-	-	175,360
5. Caston-Mountain Creek	47,853	-	-	-	-	-	47,853
6. Combined Creeks	98,048	-	-	20,224	-	-	118,272
7. James Fork Creek	32,735	-	-	106,240	-	-	138,975
8. Brazil Creek	86,580	43,420	22,100	-	-	-	152,100
9. Poteau-Heavener Laterals	58,260	4,480	-	-	-	-	62,740
10. Spiro-Bonanza Laterals	40,300	-	-	11,854	-	-	52,154
Main Stem Flood Plain	42,200	-	-	-	-	-	42,200
Total	633,074	197,044	22,100	138,318	206,720	11,064	1,208,320 1/

1/ Of the Basin total, 852,218 acres are in Oklahoma and 356,102 acres are in Arkansas.

of the Poteau River with the Arkansas River. This area was placed in a separate evaluation unit in order to coordinate the studies of the Department of Agriculture and the Corps of Engineers.

A brief description of the eight watersheds and the three study areas follows:

1. Poteau River watershed contains 275 square miles in Scott County, Arkansas, and 18 square miles in LeFlore County, Oklahoma, or a total of 293 square miles. The Poteau River rises 12 miles east of Waldron, Arkansas, and flows westerly into the Wister Reservoir. The principal tributaries are East Fork and Jones Fork. Approximately 44 percent of the watershed is in Ouachita National Forest. The boundaries of the Ouachita National Forest are shown on plate 1. A Public Law 566 work plan has been developed for the watershed and has been authorized for construction.

2. Black Fork Creek watershed contains 143 square miles in LeFlore County, Oklahoma, 48 square miles in Scott County, and 17 square miles in Polk County, Arkansas, or a total of 208 square miles. The Black Fork Creek rises in southwest Scott County and flows northwesterly and enters the Poteau River. The principal tributaries are Haws, Big, Shawnee, and Cedar creeks. About 56 percent of the watershed is within the Ouachita National Forest.

3. Holston-Reichert Creek watershed contains 153 square miles in LeFlore County, Oklahoma. The watershed is made up of Holston, Reichert, and Conser creeks, which have their origin on the Winding Stair Mountain. These streams flow northerly into the Wister Reservoir. Forty-four percent of the watershed is within the Ouachita National Forest.

4. Fourche Maline Creek watershed contains 233 square miles in Latimer County and 41 square miles in LeFlore County, Oklahoma, or a total of 274 square miles. Fourche Maline Creek rises eight miles northwest of Wilburton and flows easterly into the Wister Reservoir. The principal tributaries are Cunneo Tubby, Little Fourche Maline, Red Oak, Bandy, and Long creeks. A Public Law 566 work plan was developed for this watershed in 1960. The watershed has been authorized for construction, and about one-half of the planned measures have been installed.

5. The Caston-Mountain Creek watershed contains 75 square miles in LeFlore County. Caston Creek rises 9 miles northwest of Wister and flows southeasterly into the Poteau River. The other tributaries are Little Caston and Mountain creeks. A Public Law 566 watershed work plan has been approved on the watershed.

6. Combined Creeks watershed contains 153 square miles in LeFlore County, Oklahoma, and 32 square miles in Sebastian County, Arkansas, or a total of 185 square miles. The watershed is composed of Riddle, Gap, Nail, Sugarloaf, and Morris creeks. These streams, with the exception of Morris Creek, rise in southwestern Sebastian County and flow generally west into the Poteau River. Morris Creek heads 6 miles east of

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Heavener, Oklahoma, in the Poteau Mountains and flows northwest into the Poteau River. Almost 3 percent of the watershed is within the Ouachita National Forest.

7. James Fork Creek watershed contains 166 square miles in Sebastian County, Arkansas, and 51 square miles in LeFlore County, Oklahoma, or a total of 217 square miles. James Fork rises 5 miles southeast of Hartford, Arkansas, and flows in a northerly direction to the State line and then westerly into the Poteau River. The principal tributaries are Cedar, Cherokee, Prairie, and Hackett creeks.

8. Brazil Creek watershed contains 135 square miles in LeFlore County, 68 square miles in Latimer County, and 35 square miles in Haskell County, Oklahoma, or a total of 238 square miles. Brazil Creek rises in northeast Latimer County and flows in a northeasterly direction, entering the Poteau River in the vicinity of Panama. The principal tributaries are Owl and Buck creeks. Almost 3 percent of the watershed is within the Ouachita National Forest.

9. The Poteau and Heavener Laterals contain 91 square miles in LeFlore County and 7 square miles in Latimer County, Oklahoma, or a total of 98 square miles. The principal creeks are Cedar Creek in Latimer County, Rock Creek near Wister, and Shady Point at the north end of the area. Six percent of the watershed is within Ouachita National Forest.

10. The Spiro and Bonanza Laterals contain 63 square miles in LeFlore County, Oklahoma, and 18 square miles in Sebastian County, Arkansas, or a total of 81 square miles. This area is located in the lower reaches of the Basin. The principal tributaries are Coal and Hola Tuska on the west side and Wells, Cedar, and Mills creeks on the east side.

11. The main stem flood plain contains 66 square miles, all in LeFlore County, Oklahoma. The area extends from the Wister Reservoir to the mouth of the Poteau River. The width of the flood plain is from one to over three miles. The length of the study area is about 42 miles, and the average width is 1.6 miles.

PHYSICAL CONDITIONS

Climate

The Basin lies in the humid climatic region. Temperature is fairly uniform with slightly cooler temperatures occurring in the areas of higher elevations. The mean annual temperature is approximately 62 degrees Fahrenheit, with a maximum average daily temperature of approximately 74 degrees Fahrenheit and a minimum of 50 degrees Fahrenheit. The mean temperature ranges from 42 degrees in January to 83 degrees in July. The highest temperature recorded was 120 degrees Fahrenheit at Poteau, Oklahoma, in 1936. The lowest temperature observed was 20 degrees below zero at Waldron, Arkansas.

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High summer temperatures in the range of 100 degrees may be expected from July to September accompanied by clear skies and light to moderate winds from the south.

The average length of the growing, or frost-free, season is approximately 220 days, extending from the last of March to the first of November.

The average annual rainfall varies from approximately 40 inches in the northern section to over 45 inches in the southern, more mountainous section. Spring and early summer rains usually are more general and abundant; late summer and fall rainfall usually is more localized and less abundant and is of shower or thunderstorm type. Thirty-two percent of the annual rainfall occurs in the months of April, May, and June. The remaining rainfall is distributed rather uniformly throughout the rest of the year. The maximum and minimum rainfalls recorded were 75.95 inches (Zoe) and 20.96 inches (Poteau) respectively.

The annual snowfall is approximately 5.00 inches, usually staying on the ground only a short period of time.

The prevailing winds are mostly from the south, although a predominant swing to the north occurs in the late fall and winter months. Wind movement is rather light but reaches destructive force at times in the form of tornadoes and ordinary straight winds.

Topography

The topography is controlled almost entirely by the character and attitude of the strata. Where the formations are nearly horizontal, as in the northern two-thirds of the Basin, the relief is chiefly broad-topped hills with relatively large flat areas in between. Where the formations are tilted due to faulting and folding, as in the southern one-third of the Basin, long curving mountains, with prominant ridges and valleys, are formed by the resistant sandstone beds. The Topographic Map, plate 2, following this page shows the topography.

The northern two-thirds of the Basin is characterized by gently dipping strata forming anticlines and synclines, which are marked by cuestas and hogbacks. Near the central portions of many of the synclines, where the dips are relatively low, the ridges give way to steep slopes, leading up to a flat-topped summit or conical hill. The area is typically an inverse reflection of the underlying structure. The isolated erosional remnants of the Boggy Formation, which define the higher and more inaccessible mountains, are restricted to the synclinal areas, whereas the anticlines form low, undulating plains.

This region has three prominent synclinal structures, which form Cavanal, Sugarloaf, and Poteau mountains. Cavanal Mountain, at its summit, is approximately 2,369 feet above sea level, while the valley area ranges from about 800 feet to 400 feet near the Arkansas River.

The southern one-third of the Basin is characterized by elongated east-west trending mountains with narrow valleys. Several large thrust faults run in

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LEGEND

No.	Creek Watershed	Drainage Area	Counties
1	Poteau River (P. L. 566 Work Plan)	187,460	Scott (Ark.) LeFlore (Okla.)
2	Black Fork Creek	133,414	Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3	Holsten-Reichert-Conser	97,792	LeFlore (Okla.)
4	Fourche Maline Creek (P. L. 566 Work Plan)	175,360	Latimer, LeFlore (Okla.)
5	Caston-Mountain Creek	47,853	LeFlore (Okla.)
6	Combined Creeks	118,272	Sebastian (Ark.) LeFlore (Okla.)
7	James Fork Creek	138,975	Sebastian (Ark.) LeFlore (Okla.)
8	Brazil Creek	152,100	Haskell, Latimer, LeFlore (Okla.)
9	Poteau and Heavener Laterals	62,740	LeFlore (Okla.)
10	Spiro and Bonanza Laterals	52,154	Sebastian (Ark.), LeFlore (Okla.)
	Main Stem Flood Plain	42,200	LeFlore (Okla.)
	Totals	1,208,320	

LEGEND

- Paved Road
- Railroad
- County Line
- State Line
- Drainage
- Town or Community
- Watershed Boundary
- Sub-watershed Boundary
- (3) Watershed Number
- 0 to 500 Feet
- 500 to 750 Feet
- 750 to 1000 Feet
- 1000 to 1500 Feet
- 1500 to 2000 Feet
- 2000 to 2500 Feet
- Over 2500 Feet

STATE OF OKLAHOMA

STATE OF ARKANSAS

LATIMER

LE FLORE

POLK

Plate 2

TOPOGRAPHIC MAP

POTEAU RIVER BASIN

OKLAHOMA AND ARKANSAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER, OKLAHOMA

4-66 4-R-21,394

Revised 4-65 Base 4-R-10040

an east-west direction. Winding Stair and Rich mountains are the two most prominent mountains which form the southern boundary of the Basin. These two mountains are typical in these regions, in that tilted sandstone beds form the narrow ridge tops and broad shale beds weather into the narrow valleys. The elevation in this section ranges from about 2,500 feet on top of the mountain to 600 feet in the lower valleys.

Geology

The exposed geologic formations are chiefly sandstone and shales. The ages range from Mississippian to Pennsylvanian. The flood plain alluvium is of Recent Age. The watershed can be divided into the McAlester Basin and the Ouachita Mountain Geologic provinces. The latter is a highly complex Geological Region.

The McAlester Basin was a subsiding geosyncline from the beginning of Atoka times to the end of Desmoinesian time. Throughout that part of Early Pennsylvanian time subsequent to Atoka deposition, the shoreline of the geosynclinal sea transgressed intermittently northwestward. Continued subsidence of this unstable Basin resulted in a thick accumulation of clastic sediments from the south that formed the Hartshorne, McAlester, Savanna, and Boggy formations. While the sediments were being deposited, the Basin underwent minor deformation by lateral pressure from the south.

The Ouachita Mountain uplift took place some time between Pennsylvanian and Mid-Permian time. There are considerable differences of opinion on the time and nature of the Ouachita Orogeny. On the basis of present knowledge, it is believed that Ouachita structures originated with simple vertical movements of the basement rocks accompanied later by thrusting. The resulting gravitational gliding or spreading produced the major folds and thrust faults so prominent in this region.

A Generalized Geology Map, plate 3, illustrating the geology of the Basin, follows page 16.

Stanley Shale is the oldest formation and outcrops in a narrow band near the southern boundary. Most of the Stanley is composed of black, fissile shale that weathers to an olive gray. There are beds within this formation that are fine grained, argillaceous, dirty, easily weathered sandstone.

Jackfork outcrops in a band on the southern border. Generally, sandstone is the prevailing rock type in this formation, but it also contains dark gray shale beds in some areas. The sandstone beds are massive and resistant to erosion, thus forming the high linear ridge known as Winding Stair Mountain. The Jackfork Formation is between 6,000 and 8,000 feet thick in the Ouachita Mountain region.

Johns Valley outcrops around Winding Stair Mountain and extends in a narrow band, marking the trace of the Stapp Fault, to the vicinity of Stapp, Oklahoma. The formation is a black, platy, fissile shale and contains marble-like phosphatic nodules, large black limestone concretions, and exotic boulders. The large exotic boulders are the most distinguishing characteristics and make it easy to recognize the Johns Valley deposits. The formation is about 990 feet thick.

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The Wapanucka is located on the upthrown side of the Choctaw Fault in the western section. The Wapanucka is a fossiliferous limestone dipping at a high angle to the south.

The Atoka Formation covers the major part of the southern one-third of the Basin. It also is found in the eastern section of the watershed and along the Backbone Fault in the northern part of the area. The formation consists of gray shale, commonly containing beds and lenses of clay ironstone and much siltstone. There are ridge-forming sandstone units at widely spaced intervals. Some sandstone lenses vary as much as 15 feet in thickness at the side of the belt to 150 feet at its middle part. Some plant fossils are found in the Atoka, and the formation reaches a thickness of about 7,000 feet in this region.

The Hartshorne is exposed on the south of the Atoka Formation and consists mostly of sandstone and hard siltstone, with a small amount of shale. The Hartshorne is an ashy white color, coarse to fine grained, hard sandstone. The Lower and Upper Hartshorne coal beds are very valuable and are strip mined in this area. There are a few invertebrate fossils found in the formation; however, plant fossils are abundant. The Hartshorne ranges in thickness from about 10 feet to 300 feet in exposures in the Basin area.

The McAlester Formation covers the major part of the northern one-half of the Basin. It consists mainly of a dark, gritty shale but contains several beds of sandstone and coal. It ranges in thickness of 2,500 feet near the Cavanal Syncline to 500 feet near Fort Smith, Arkansas. The Cameron Sandstone member is a gray, hard sandstone and is used as roadbed material throughout the area. There are several commercially mined coalbeds in this formation. Plant fossils are abundant and well preserved throughout the McAlester Formation.

The Savanna Formation outcrops around Cavanal, Sugarloaf, and Sanbois mountains. The formation forms low ridges around these mountains. The Savanna consists of alternating sandstones and shales with one minable coalbed. The sandstones are generally buff or gray-green, fine-grained, ripple-marked at contacts with adjacent shale, and crossbedded. The shales are gray-green, silty, and contain concretionary concentric-breaking masses. The formation varies from 140 to 960 feet thick. Plant fossils are abundant at several horizons in the Savanna.

The Boggy Formation caps the synclinal Cavanal and Sanbois mountains. The formation consists of alternating units of fine to medium-grained sandstone, siltstone, and silty shale with three valuable coalbeds. The sandstones are buff to gray-green, ripple marked, and crossbedded. The Bluejacket is a member of the Boggy that is generally placed near the base in the geologic column. This member forms steep ridges around the synclinal mountains and is 300 feet thick. The overall thickness of the Boggy is approximately 4,000 feet, with many fossils located in this formation.

Alluvial deposits of Recent Age occur along all major and some minor streams. These deposits consist of unconsolidated sands, silts, and clays which include recent organic matter. Their color ranges from brown, to gray, to black. The thickness of the alluvial deposits ranges from just a few feet to about 50 feet.

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LEGEND

No.	Creek Watershed	Drainage Area	Counties
1	Poteau River (P. L. 566 Work Plan)	187,460	Scott (Ark.) LeFlore (Okla.)
2	Black Fork Creek	133,414	Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3	Holsten-Reichert-Conser	97,792	LeFlore (Okla.)
4	Fourche Maline Creek (P. L. 566 Work Plan)	175,360	Latimer, LeFlore (Okla.)
5	Caston-Mountain Creek	47,853	LeFlore (Okla.)
6	Combined Creeks	118,272	Sebastian (Ark.) LeFlore (Okla.)
7	James Fork Creek	138,975	Sebastian (Ark.) LeFlore (Okla.)
8	Brazil Creek	152,100	Haskell, Latimer, LeFlore (Okla.)
9	Poteau and Heavener Laterals	62,740	LeFlore (Okla.)
10	Spiro and Bonanza Laterals	52,154	Sebastian (Ark.), LeFlore (Okla.)
	Main Stem Flood Plain	42,200	LeFlore (Okla.)
	Totals	1,208,320	

LEGEND

- Paved Road
- Railroad
- County Line
- State Line
- Drainage
- Town or Community
- Watershed Boundary
- Sub-watershed Boundary
- Watershed Number
- Fault (D / U)
- Hidden Fault (D / U)

Qal	Quaternary	Alluvium
Qts		Terrace Deposits
IPb	Pennsylvanian	Boggy
IPbj		Bluejacket
IPs		Savaana
IPm		McAlester
IPh		Hartshorne
IPa		Atoka
IPw		Wapanucka
IPj		Johns Valley
Mj	Mississippian	Jack Fork
Ms		Stanley

OKLAHOMA ARKANSAS

STATE OF OKLAHOMA

STATE OF ARKANSAS

LE FLORE

SCOTT

Plate 3

GENERALIZED GEOLOGY
POTEAU RIVER BASIN
OKLAHOMA AND ARKANSAS

U. S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER, OKLAHOMA

11-65 4-R-20761
Revised 4-65 Base 4-R-10040

The most important mineral resources are coal and gas. This region supplies an abundance of both with the possibility of greater production in the future. There are also valuable sand, gravel, and building stone deposits in various places throughout the area.

Soils

Four general soil groups in the Poteau River Basin are delineated on the General Soil Map, plate 4, following this page, and described in the narrative.

The Miller-Yahola-Brewer association was developed from Recent alluvium and is found on the common flood plain of the Poteau and Arkansas rivers. These soils are the most fertile, most cultivated, and occupy about 80 percent of the association. Miller soils are nearly level, somewhat poorly drained, reddish, clayey soils that are subjected to infrequent overflows. Yahola, an undulating, moderately sandy, well-drained, calcareous soil is subject to occasional flooding and occurs in areas close to the river channel. Brewer soils are dark, medium textured, moderately well-drained, nearly level, and seldom overflow.

The remainder of the association consists of the Lincoln and Pulaski soils. Lincoln is an undulating, excessively drained, sandy soil. Pulaski is a level to gently sloping, moderately sandy, well-drained soil.

Most of these soils are being cultivated. About 30 percent of the soils in this association have only minor limitations that restrict their use. About 45 percent of the soils have some limitations that reduce the choice of plants; however, they respond well to good management and proper fertilization. About 15 percent of the soils have severe limitations which reduce the choice of crops that can be grown, or require special conservation practices or both. Ten percent of the soils are not suited to cultivated crops because of flooding.

Lee (Atkins 1/)-Philo-Pope association is deep, level to gently sloping, poorly to well-drained bottomland soil that occurs along the Poteau River and major tributaries. The soil formed in alluvium, originating in areas developed from sandstone and shale.

Lee soils are nearly level, gray, poorly drained, and are frequently flooded. They have silt loam surface layers and silty clay loam subsoils. Philo has a brown, deep, moderately well-drained, silt loam surface, with a light yellow brown, silty clay loam subsoil, and is subject to minor flooding. Pope soils are a brown, fine, sandy loam throughout the profile and seldom flood.

Most of the soils in this association have been cleared of trees and are used for cultivation, pasture, or meadow. About 20 percent of this group is not presently suited for cultivation because of frequent flooding. Lime is the principal fertilizer used, and under proper use the soils produce moderate to high yields.

1/All field data were mapped as Atkins, but name has been changed to Lee.

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Hector-Linker-Enders association was developed under Savannah or timber from interbedded sandstone and shale. This group occupies steep, stony areas where the dominant cover is woodland with some intergrowing native grasses. The soils in this association occupy about equal parts of the area. A change from one soil to another within a short distance in the landscape is common.

Hector soils are very shallow to shallow soils formed from sandstone. The moderately deep to deep soils are: Linker soils formed from sandstone and Enders soils formed from shale. Included in the association are small areas of gently to strongly sloping Linker, Herndon, and Hector soils that are not stony. These soils usually occur along ridge tops.

Taloka-Choteau-Bates association was developed under Savannah vegetation from alluvium, sandstone, and shale. This soil group consists largely of nearly level to strongly sloping, moundy soils with small amounts of steeper stony soils.

Taloka soils are deep, imperfectly drained, nearly level to gently sloping soils with silt loam surface layers and clayey subsoils. Choteau soils are deep, moderately well-drained, sloping soils with silt loam surface layers and silty clay loam subsoils. Bates soils are moderately deep to deep, well-drained, gently sloping soils with silt loam surface layers and light silty clay loam subsoils.

Some areas of this association are suited to cultivated crops; however, they have limitations that restrict their use and require careful management to maintain profitable yields. The major portions of these soils are best suited for pasture, meadow, and native rangeland.

Land Use

The major land use is forest, comprising 827,440 acres or about 68 percent of the land area. Practically all the steeper slopes at the higher elevations are in forest cover. There are 213,245 acres of the Ouachita National Forest in the southern part of the Basin. Twenty-eight percent of the forest land is publicly owned, and 72 percent is privately owned. Much of the forest land owned by private interest includes non-commercial types and is being used to graze livestock.

About 11 percent of the area, or 128,850 acres, is cropland, devoted mainly to support livestock production.

The 194,900 acres of pasture and rangeland constitute 16 percent of the area. Much of the pastured land formerly was cultivated.

About 5 percent, or 57,130 acres, is in uses other than agricultural and forestry. An increasing amount of land each year is being diverted to meet the needs of a growing urban population for homes and recreational areas, highways, and other miscellaneous uses. A tabulation of the major land use listed by watershed and counties is shown in Appendix table A1, page 118. The Land Use Map, plate 5, following page 20 shows the major land uses.

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LEGEND

No.	Creek Watershed	Drainage Area	Counties
1	Potaau River (P. L. 566 Work Plan)	187,460	Scott (Ark.) LeFlore (Okla.)
2	Black Fork Creek	133,414	Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3	Holsten-Reichart-Conser	97,792	LeFlore (Okla.)
4	Fourche Maline Creek (P. L. 566 Work Plan)	175,360	Latimer, LeFlore (Okla.)
5	Caston-Mountain Creek	47,853	LaFlore (Okla.)
6	Combinad Creeks	118,272	Sebastian (Ark.) LeFlore (Okla.)
7	James Fork Creek	138,975	Sebastian (Ark.) LeFlore (Okla.)
8	Brazil Creek	152,100	Haskell, Latimer, LeFlore (Okla.)
9	Poteau and Heavener Laterals	62,740	LeFlora (Okla.)
10	Spiro and Bonanza Laterals	52,154	Sebastian (Ark.), LeFlore (Okla.)
	Main Stem Flood Plain	42,200	LeFlore (Okla.)
	Totals	1,208,320	

LEGEND

- Paved Road
- Railroad
- County Line
- State Line
- Drainage
- Town or Community
- Watershed Boundary
- Subwatershed Boundary
- 3 Watershed Number
- Miller-Yahola-Brewer
- Lee-Phito-Pope
- Hector-Lenker-Enders
- Taloka-Choteau-Bates

STATE OF OKLAHOMA

STATE OF ARKANSAS

HASKELL · LATIMER · LE FLORE · SEBASTIAN · POLK · SCOTT

FORT SMITH · SPIRO · PANAMA · McCURTAIN · POTEAU · WILBURTON · HEAVENER · HUNTINGTON · HARTFORD · WALDRON

OKLAHOMA ARKANSAS

Plate 4

GENERAL SOIL MAP

POTEAU RIVER BASIN

OKLAHOMA AND ARKANSAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER, OKLAHOMA

10-65 4-R-20715

Revised 4-65 Boso 4-R-10040

USDA-SCS-FORT WORTH, TEX. 1888

SOIL CONSERVATION SERVICE PHOTO

The major land use in the Basin is forest

SOIL CONSERVATION SERVICE PHOTO

Eleven percent of the Basin area is cropland

4-23630 3-67

SOIL CONSERVATION SERVICE PHOTO

Pasture and rangeland amount to 16 percent of the Basin area

The cover conditions of the pasture and rangeland range from about 20 percent in excellent cover, 50 percent in good cover, 20 percent in fair cover, and 10 percent in poor cover. These determinations were made by studying records in the field offices of the Soil Conservation Service and from sediment source investigations above structure sites.

Forest cover conditions were derived from an expansion of data collected in watershed surveys. Forest cover conditions described here pertain to degree of stocking and canopy 1/ and are not the same as forest hydrologic conditions. This latter item is discussed under forest resource problems, page 58. Forests are 72 percent well stocked, 24 percent medium stocked, and 4 percent poorly stocked. Canopy cover is 27 percent good, 51 percent fair, and 22 percent poor. These percentages of stocking and canopy show that forest cover per se is in fair to good condition.

Land Capabilities

An interpretative grouping of soils into "Land Capability Classification" has been developed by the Soil Conservation Service. Soil characteristics such as depth, texture, wetness, slope, erosion, and overflow hazards, permeability, structure, reaction, water-holding capacity, fertility, and climatic conditions are considered in grouping soils into eight land capability classes. These eight classes are designated by Roman numerals and indicated by the "Capability Class Description Chart." The hazards and

1/ Forestry definitions, Appendix, page 164.

4-23030 3-57

LEGEND

No.	Creek Watershed	Drainage Area	Counties
1	Poteau River (P. L. 566 Work Plan)	187,460	Scott (Ark.) LaFlore (Okla.)
2	Black Fork Creek	133,414	Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3	Holston-Reichart-Conser	97,792	LaFlore (Okla.)
4	Fourche Melina Creek (P. L. 566 Work Plan)	175,360	Latimer, LaFlore (Okla.)
5	Ceston-Mountain Creek	47,853	LaFlore (Okla.)
6	Combined Creeks	118,272	Sebastian (Ark.) LeFlore (Okla.)
7	Jamas Fork Creek	138,975	Sebastian (Ark.) LeFlore (Okla.)
8	Brazil Creek	152,100	Haskell, Latimar, LeFlore (Okla.)
9	Poteau and Heavaner Laterals	62,740	LeFlore (Okla.)
10	Spiro and Bonanza Laterals	52,154	Sebastian (Ark.), LaFlora (Okla.)
	Main Stem Flood Plain	42,200	LaFlore (Okla.)
	Totals	1,208,320	

LEGEND

- Paved Road
- Railroad
- County Line
- State Line
- Drainage
- Town or Community
- Watershed Boundary
- Subwatershed Boundary
- 3 Watershed Number
- More than 90% Cropland
- More than 50% Cropland
- Pasture - Range
- Woodland Grazed
- Forest Land

STATE OF OKLAHOMA

STATE OF ARKANSAS

HASKELL

LE FLORE

LATIMER

SEBASTIAN

POLK

OKLAHOMA ARKANSAS

Plate 5

GENERAL LAND USE

POTEAU RIVER BASIN

OKLAHOMA AND ARKANSAS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER, OKLAHOMA

10-65 4-R-20714

Revised 4-65 Base 4-R-10040

USDA-SCS-FORT WORTH, TEX. 1965

limitations of the use of the group increase as the class number increases. Class I land has few hazards or limitations, whereas Class VIII land is so limited that it cannot be used for anything but recreation, wildlife habitat, or aesthetic purposes. Generally speaking, the classification can be broken into two divisions: (1) Land in Capability Classes I through IV is suited for cultivation and other uses, and (2) Land in Capability Classes V through VIII is best suited for range, forestry, and wildlife because of its own limitations. The acreage for each land use grouped by capability class is shown in Appendix table A3, page 119.

Capability Class Description

Class I - Soils in Class I have few limitations that restrict their use.

Class II - Soils in Class II have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III - Soils in Class III have severe limitations that reduce the choice of plants or require special conservation practices or both.

Class IV - Soils in Class IV have very severe limitations that restrict the choice of plants and require very careful management.

Class V - Soils in Class V have little or no erosion hazard but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat.

Class VI - Soils in Class VI have severe limitations that make them generally unsuited for cultivation and limit their use largely to pasture and range, woodland, or wildlife habitat.

Class VII - Soils in Class VII have very severe limitations that make them unsuited for cultivation and restrict their use largely to grazing, woodland, or wildlife.

Class VIII - Soils and land forms in Class VIII have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or aesthetic purposes.

There are subclasses in the capability units system that have the same kinds of dominant limitations for agricultural use as the capability class, but the subclass limitation has to have special care. The three kinds of limitations recognized at the subclass levels are risks of erosion, designated by the symbol (e); wetness drainage, or overflow (w); and root-zone limitations (s).

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ECONOMIC CONDITIONS

Settlement and History

A small expedition in 1719, under Bernard De La Hope, entered the eastern counties of Oklahoma, and these probably were the first white people to explore this region. Old Fort Smith was established in 1817 at Belle Point, overlooking the confluence of the Poteau and Arkansas rivers. The fort was established to impede extensions of the settlement of white immigrants and prevent warfare between the native Osage Indians and the Cherokees who had been moved into the territory from the Appalachian region.

On January 14, 1825, a treaty was made with the Choctaw Indians which established the boundary of the Indian Territory in Oklahoma and opened the Arkansas portion of the Basin to settlement. In the early 1830's white people began to move into the area from Tennessee, Mississippi, Georgia, and Alabama. The area which is now Scott County was settled very rapidly, and the population rose from 1,694 in 1840 to 5,145 in 1860.

The Oklahoma portion was given to the Choctaw Indians by a treaty known as the Treaty of Dancing Rabbit Creek, ratified February 24, 1831, in exchange for their land in Mississippi. In 1833 the Choctaws under Chief Moshola-tubbee began the move to Indian Territory.

In 1879 the Bill Allens and a Whitson family moved to what is now the city of Poteau in LeFlore County. Before this there were only two white families in the area. The earliest white inhabitant in what is now Latimer County was William Baird, who built a store and traded with the Indians.

The Five Civilized Nations of Indian Territory governed themselves and developed a full judiciary system. They also developed their own school system. The continued influx of white people into the area created problems in law enforcement and contributed to Oklahoma becoming a State in 1907.

The first farming efforts of the early settlers were the growing of food crops and the grazing of livestock, along with hunting, trapping, and fishing. The availability of large areas of grazing land has caused the production of livestock to remain an important phase of agriculture. Before 1900, attempts were made by many of the farmers to grow diversified crops; however, this practice was discontinued gradually until only corn, cotton, and feed for livestock were the principal crops.

Farming, including the production of livestock, coal mining, and forest products, constituted the principal industries in the early history of the region.

Population

By 1910 the population had grown to about 50,000. The population growth and the settlement of the residents were influenced by the development of various industries. Coal mining activities attracted people from many states and countries, which contributed to the development of the area. During the early period the timber industry provided significant employment

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for a larger percentage of the population. The railroads had an important influence on the industrial growth and development.

The population increased to approximately 60,000 in 1920, and of these 65 percent were rural residents. From 1920 to 1930 there was a decrease in both rural and urban population. Since 1930 the urban population has been increasing; however, from 1930 to 1940 the rural portion gained some of the lost population from the previous ten years. During the period 1940-1965 the population has steadily declined even with the increased urban population. The Basin has lost population until there are only 44,000 residents, and of these only 38.6 percent are rural people. In about 1949 the percentages of rural and urban population were equal. Figure 1 shows population change during the past 50 years.

The change from intensive row crops to extensive livestock enterprises has resulted in small farms being combined into larger units, contributing to a decline in the rural segment of the population. The declining employment in the coal industry, timber, and railroads has been offset by some light industry, such as woodworking, electronics, clothing, and the development of the natural gas fields.

Fort Smith, Arkansas, a city of 65,000, lies partly in the Basin and is expanding at the present time. Poteau, Oklahoma, with a population of 4,428, is the largest city entirely within the Basin.

The following tabulation gives the 1960 population of towns in the Basin:

Oklahoma		Arkansas	
Poteau	4,428	Fort Smith	52,991 1/
Heavener	1,891	Hartford	531
Panama	937	Huntington	560
Arkoma	1,862	Midland	261
Howe	390	Mansfield	881
Bokoshe	431	Hackett	328
Spiro	1,450	Bonanza	247
Wister	592		
Wilburton	1,772		
Red Oak	453		
McCurtain	528		
Cameron	211		

(U.S. Census of Population - 1960)

1/ Lies partly in the Basin.

The population characteristics and the changes from rural to urban are summarized in Appendix table A8, page 123.

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The following chart illustrates the changes in rural and urban population in the Basin area in the period from 1910 to 1960.

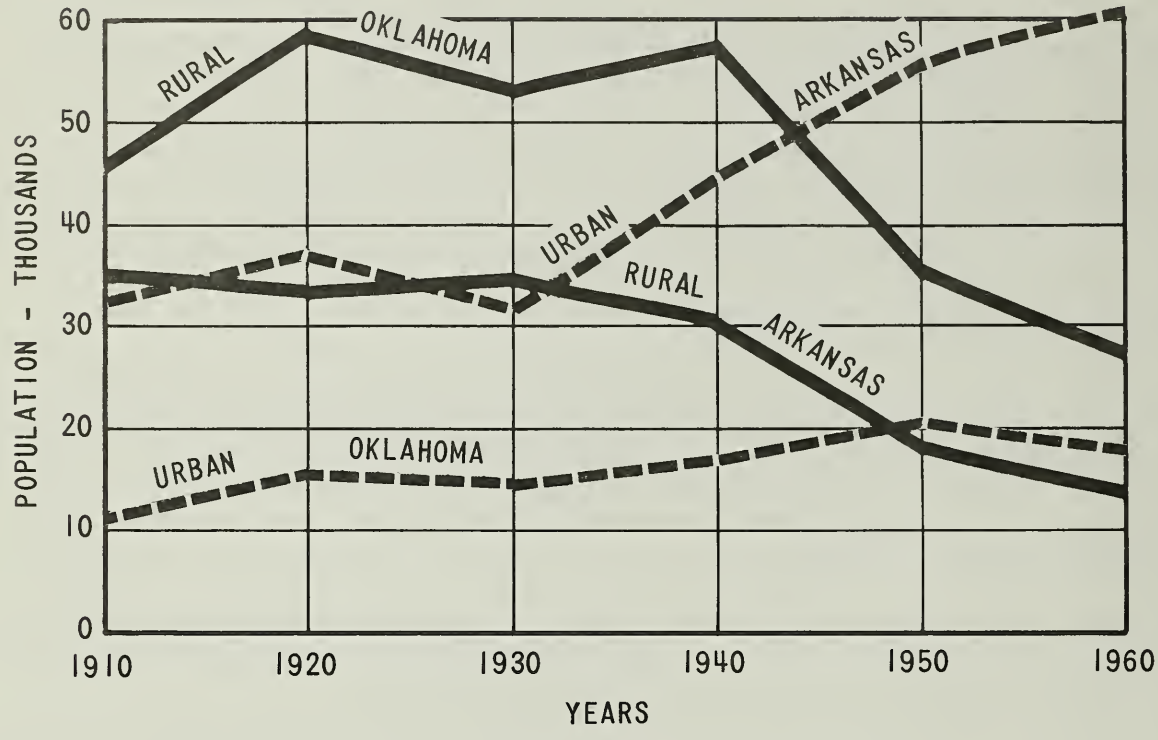

Figure 1 - Population in Basin Area
Poteau River Basin, in Oklahoma and Arkansas

Transportation

During the early settlement, there were only two roads through the Basin. One was from Fort Smith, Arkansas, to Fort Towson, Oklahoma, on the Red River. The other was from Fort Smith to Atoka, Oklahoma, via Boggy Depot to Gainesville, Texas.

In 1882, the Frisco Railway Company received the right to build a line from St. Louis, Missouri, to Paris, Texas, through Poteau, Oklahoma. The Choctaw, Oklahoma, and Gulf Railroad was started in 1889 and was built from McAlester, Oklahoma, to Wilburton, then to Wister, Oklahoma, in 1891. The Kansas City Southern built a railroad through Poteau in 1895. During the period 1903 and 1904, the M.K.& T. Railroad built a branch line from McAlester to Wilburton, chiefly to haul coal.

Adequate rail transportation was provided to serve the Basin by the Kansas City Southern; St. Louis and San Francisco; Midland Valley, Chicago, Rock Island and Pacific; Arkansas Western; and Fort Smith and Van Buren railroads. The Fort Smith and Van Buren Railroad is the only one of these that has abandoned any major segments of roadbed. The Kansas City Southern and the Rock Island railroads are the only two lines still providing passenger service. The existing railroads have a network of 266 miles of roads that adequately serve the Basin.

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U. S. FOREST SERVICE PHOTO

Typical highway through forest portion of the Basin

Both State and Federal highways in the area have been improved through the years. Federal highways are US 270, 271, 59, 259, and 71, and Oklahoma State highways are OK 31, 2, 83, 112, 128, 120, 9, and 9A. Arkansas State highways are ARK 28, 80, 248, 8, 96, 252, 45, and 10. These highways, along with the railroads, provide adequate transportation to markets in and beyond the Basin. There are 257 miles of State and Federal highways and almost 1,200 miles of county roads. About 10 percent of the county roads are blacktop or improved providing access to most of this region.

Airlines provide service out of Fort Smith, Arkansas, and air strips have recently been completed in Poteau and Wilburton, Oklahoma. All the major towns have bus or train service.

Employment and Industry

Early employment was related to agriculture. According to records at the Fort Smith National Historic Site (administered by the National Park Service), there was a cotton gin being operated in 1827 by the civilian firm of Nicks and Rodgers in one of the blockhouses at the Old Fort. The area has always been well suited for cattle production.

The lumber industry started with the first settlement and provided employment for residents. At the present time, wood-using industries in the Basin area include some 38 establishments providing employment for about 800 people (450 in primary industries and 350 in secondary industries).

Nearby cities of Fort Smith, Van Buren, and Mena, Arkansas, have 51 wood-using industries employing some 4,300 people.

The wood industries may be divided into two broad groups: primary industries, which use timber in log or bolt form, and secondary industries, which use wood from the first stages of manufacture for making a wide variety of finished and semi-finished products. In this area, the principal primary products are lumber, hardwood specialty products, posts, poles, and piling for wood preservation treatment, pulpwood, and charcoal. There are presently no pulp mills in the Basin area. The principal secondary products are furniture, millwork, specialties, and converted paper products.

Plate 6, following this page, shows the location of the forest industries.

In the Basin area there are four medium-size sawmills with annual production of 3 to 12 million board feet each and 13 intermittently operated small sawmills. Three of the larger sawmills are located in Waldron and Mansfield, Arkansas, and at Heavener, Oklahoma. Another sawmill of medium size is at Mena, Arkansas. The small sawmills produce mostly for local use, in the form of lumber, bridging, and mining timbers, with some additional output in the form of hardwood, small dimension stock, and railroad ties.

There are some 12 wood yards for concentration and loading of posts, poles, piling, railroad ties, and pulpwood.

OKLAHOMA DIVISION OF FORESTRY PHOTO

Loading pulpwood at the Heavener Railhead

LEGEND

No.	Creek Watershed	Drainage Area	Counties
1	Poteau River (P. L. 566 Work Plan)	187,460	Scott (Ark.) LeFlore (Okla.)
2	Black Fork Creek	133,414	Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3	Holsten-Reichert-Conser	97,792	LeFlore (Okla.)
4	Fourche Maline Creek (P. L. 566 Work Plan)	175,360	Latimer, LeFlore (Okla.)
5	Caston-Mountain Creek	47,853	LeFlore (Okla.)
6	Combined Creeks	118,272	Sebastian (Ark.) LeFlore (Okla.)
7	James Fork Creek	138,975	Sebastian (Ark.) LeFlore (Okla.)
8	Brazil Creek	152,100	Haskell, Latimer, LeFlore (Okla.)
9	Poteau and Heavener Laterals	62,740	LeFlore (Okla.)
10	Spiro and Bonanza Laterals	52,154	Sebastian (Ark.), LeFlore (Okla.)
	Main Stem Flood Plain	42,200	LeFlore (Okla.)
	Totals	1,208,320	

LOCATION OF FOREST INDUSTRIES

PRIMARY
- Sawmill
- Wood Preserving Plant
- Pole, Post, Pulpwood, or Tie Yard
- Charcoal Plant
- Other

SECONDARY
- Furniture
- Millwork or Specialties
- Paper Converters

NUMBER OF EMPLOYEES
- 1 - 50
- 51 - 200
- 200 +

LEGEND
- Paved Road
- Railroad
- County Line
- State Line
- Drainage
- Town or Community
- Watershed Boundary
- Sub-watershed Boundary
- 3 Watershed Number
- Ouachita National Forest Boundary

MAJOR FOREST TYPES
- Shortleaf Pine
- Oak - Pine
- Oak - Hickory
- Oak - Gum - Cypress

OKLAHOMA ARKANSAS

Plate 6

FOREST TYPES AND INDUSTRIES

POTEAU RIVER BASIN

OKLAHOMA AND ARKANSAS

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER OKLAHOMA

4-66 4-R-21,395

Revised 4-65 Base 4-R-10040

The mountain area in west central Arkansas and east central Oklahoma is a major source of commercial posts for treatment. The present small size of much of the pine timber and the proximity to the prairie country to the west accounts for this trend. In recent years there has been a considerable development in the production and use of creosoted pine posts. A pressure-treatment wood preservation plant is located at Panama, Oklahoma, for the creosoting of poles, posts, railroad ties, and lumber.

OKLAHOMA DIVISION OF FORESTRY PHOTO

Pine posts provide a ready market for pine thinnings

Pine pulpwood was for several years an important item of production; however, since 1957 there has been a sharp drop in the output. This latter development has taken place because of a rapid, South-wide growth in production of pulping chips from sawmill coarse waste in use of hardwood species for pulping, and because of a change in pulpwood procurement favoring the drawing of roundwood from closer to the mills.

Two of the larger sawmills in the Basin area, at Waldron and Mansfield, now have facilities for producing pulping chips from mill waste. Pulp mills nearest to this region are located at Pine Bluff and Camden, Arkansas, and at Springhill, Louisiana. Other primary industry plants are a pine furniture plant and a charcoal plant at Heavener, Oklahoma, and a stave mill at Waldron. Other plants near the Basin area are two wood preservation plants and a stave mill at Mena, Arkansas, and a handle-stock plant at Fort Smith.

U. S. FOREST SERVICE PHOTO

One of the large sawmills located in the Basin

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Secondary industries include a furniture upholstering plant, a hardwood lumber cut-up plant producing dimension stock and finished parts, and a molding and trim plant at Waldron; a molding and trim plant at Abbott; and small planing mills at Heavener and Wilburton.

At Fort Smith and Van Buren there are 26 furniture plants, 12 millwork and specialty plants, and 5 paper converting plants. The furniture plants manufacture a wide variety of furniture, including home, office, school and institutional, and motel and hotel furniture, period reproductions, and custom work. The millwork and specialty plants similarly have a wide variety of output, including sash, doors, and window units, architectural millwork, molding and trim, flooring, venetian blinds, molded wood products, wood carving, and custom woodworking. The paper converting plants produce paper cups and plates, shipping containers, and paper boxes.

At Mena, there is a plant that produces prefabricated culverts and laminated decking, a plant that does mill and cabinet work, and a plant that makes bed slats and other wood products. Fifteen of the secondary plants listed are new within the past 7 years.

The primary forest industries draw their raw material supply without regard to watershed boundaries. Sawmill logs ordinarily are drawn from within a trucking radius; and the mills at Waldron and Mansfield, particularly, are situated for drawing a part of their timber requirements from outside the Basin area. Poles, piling, posts, and railroad ties often move considerable distances before treatment; and the wood preservation plant at Panama, Oklahoma, draws much of its untreated material from Arkansas, Louisiana, and Texas outside the Basin. Pulpwood also moves for considerable distances; but most pulp mills draw a greater part of their wood from within a radius of 100 miles.

The larger primary plants and much of the commercial post production are dependent in large measure upon National Forest timber, since four-fifths of the pine timber and most of the better stands are located on National Forest land. Of the timber cut within the Basin area, it is estimated that two-thirds is from the National Forest and one-third from privately owned land. The smaller forest industry plants usually draw their timber from the immediate vicinity of the mills.

Coal mining started in the middle 1800's and was one of the primary industries. The supplies have not been depleted; however, in recent years the number of people employed in coal mining has declined until it is no longer a major industry.

The construction of railroads provided employment for early settlers. Maintenance of the roadbeds and rolling stock provide some employment at the present time. The Kansas City Southern has a division headquarters located at Heavener, Oklahoma.

The change in agriculture has caused a shift in the composition of the labor force. Table 2, page 30, shows the number and percent of the labor force in farm employment for the counties within the Basin. As can be seen in this table, the farm labor force has continued to decline between 1940 and 1960.

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SOIL CONSERVATION SERVICE PHOTO

Strip mining operation near McCurtain, Oklahoma

Table 2 - Farm Labor Force and Percent of Total Labor Force in Farm Employment by Counties Poteau River Basin, in Oklahoma and Arkansas

Counties	1940		1950		1960	
	Number	Percent	Number	Percent	Number	Percent
Scott	1,858	43.74	1,148	37.08	399	15.75
Sebastian	2,424	10.26	1,672	7.11	458	1.83
Haskell	2,447	49.41	2,025	51.70	560	22.51
Latimer	1,199	31.17	904	34.54	289	3.85
LeFlore	4,595	34.17	2,866	29.67	991	12.05

Sebastian County, Arkansas, is the only county out of the five that has not been designated as an area suffering from chronic unemployment under the Area Redevelopment Administration. Fort Smith, Arkansas, is in Sebastian County and has had an exceptional growth over the past few years. From 1957 to 1960 there were 122 industries that expanded their operations, creating

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2,250 new jobs. In 1960 Norge Corporation built a new plant in Fort Smith, and this was the largest plant built in the United States by private industry that year.

Waldron, Arkansas, in Scott County, recently has completed the building of a new water supply. The multipurpose structure affording municipal water was a joint effort between the local soil and water conservation district, local water improvement district, and the town of Waldron. Technical assistance was furnished by the Soil Conservation Service, USDA, under Public Law 566 for watershed protection and flood prevention. Arkansas Valley, Inc., a company that provides baby chicks, feed, veterinary, and technical services to producers and processors of the broilers, plans to expand production now that water is available; lack of water has curtailed any expansion in production in the past. The new jobs created by this expansion will alleviate some of the need for employment, but more industry will be needed for this area.

Wilburton, Oklahoma, in Latimer County, has completed a water supply in cooperation with the Latimer County Soil and Water Conservation District, the LeFlore County Soil and Water Conservation District, and the Fourche Maline Conservancy District with the help of a Federal grant. The Soil Conservation Service, USDA, furnished technical assistance in developing and carrying out a watershed protection and flood prevention project on Fourche Maline Creek watershed. The towns of Wilburton and Red Oak are participating in a recreational development at site 11 on this watershed. The Oklahoma State Planning and Resources Board has participated with matching funds and stored additional water in site 4, and the Oklahoma Department of Wildlife Conservation is providing $90,000 for cost sharing of additional storage in site 5, Fourche Maline Creek. Sites 4 and 5 are in Robbers Cave State Park. These developments will provide employment for local residents and will stimulate the economy, thereby providing more jobs in the service industries.

Poteau, in LeFlore County, has been able to attract several industries in the past few years. Graphics, Inc., has moved its home office from New Jersey and is in the process of moving the California plant to Poteau. This company now has 55 employees and plans to increase the number of employees in the near future. There is also a garment manufacturing company in Poteau with 92 employees. A woodworking company that makes wooden parts for furniture started operations in Poteau recently and is now in the process of expanding. The Kansas City Southern Railroad division headquarters is located at Heavener and provides employment in that area.

The industries in Fort Smith, Arkansas, provide employment for a large number of residents of LeFlore County.

Production

The crop yields for the major crops of the Basin have been normalized for present 1963 average-per-acre yields by soil groups. This has been adapted to the Basin from work done by the Economic Research Service, in cooperation with the Soil Conservation Service in the Arkansas Valley and Cherokee Prairie Land Resource Areas of Arkansas.

Table 3 gives normalized yields for different soil groupings in the Basin. The yields in Soil Group 1 are for the area of common flood plain of the Arkansas and Poteau rivers. Those soils that occur in the bottomlands of the remaining Poteau River and all its major tributaries fall in Group 2. The upland soils that are being used for cultivated crops are in Group 3. Those that are being used for pasture production only are found in Group 4.

Table 3 - Normalized Yields for Major Crops by Soil Groups - 1963
Poteau River Basin, in Oklahoma and Arkansas

Crops	Unit	Soil Productivity Groups 2/			
		1	2	3	4
Soybeans	bu.	24.3	19.6	11.8	-
Lint Cotton	lb.	435	271	163	-
Corn	bu.	37.2	27.9	18.6	-
Wheat	bu.	34.4	-	-	-
Oats	bu.	53.2	26.6	-	-
Alfalfa Hay	ton	2.31	-	-	-
Hay (Except Alfalfa)	ton	1.50	1.12	-	0.90
Improved Pastures 1/	a.u.m.	6.0	3.0	3.0	5.0
Native Pastures 1/	a.u.m.	1.5	1.5	1.2	1.0

1/ Pasture yields not normalized.
2/ Groups of similar soils that have approximately the same productivity.

The acreage of field crops has steadily declined since 1940; during the same period there has been an increase in acres used for pasture and hay production. Appendix table A7, page 122, is a breakdown of the cultivated crops being grown at the present time.

The number of cattle and calves two years and older on farms has increased from 22,000 in 1940 to 43,000 head in 1965. The five counties that comprise the Basin have increased their acreage of pasture, other than woodland, from 368,678 acres in 1944 to 596,006 acres, and improved pastures increased from 61,940 acres in 1954 to 94,909 in 1959. Producers of livestock have improved their herds of beef cattle and increased their production of forage crops used for grazing since 1940. The increase in acres of improved pasture and the increased values of herd inventories on a constant dollar basis reflect this trend. Prior to 1930 cash crops were the major enterprise in the Basin, and cattle production was secondary with a majority of the farmers. During this time, open range was practiced extensively and there was very little upgrading of livestock quality. In recent years land is being fenced to improve pastures and livestock herds. During the latest session of the Oklahoma Legislature, a bill was passed to close the remaining open range in the State.

The production of broilers has become an important part of the agricultural economy since 1954. Broiler production has increased from about 847,450 in 1954 to approximately 5,300,000 in 1965.

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The swine numbers have declined from about 18,000 in 1940 to approximately 6,000 in 1960.

The average annual cut from the Basin's forests over the past five years has been 16 million board feet of sawtimber and 60 thousand cords of smaller growing stock. Softwood cut has been 59 percent for lumber, 39 percent for commercial posts, poles, and pulpwood, and 2 percent for fuelwood and other domestic use. The hardwood cut has been 46 percent for lumber and railroad ties, 6 percent for other commercial products, and 48 percent for fuelwood and other domestic use.

Income

The Corps of Engineers gathered information on per-capita income for their base study area that was comprised of ten counties in Arkansas and Oklahoma. The estimated per-capita income for the area for 1960 is $1,347. Based on this estimate the total income for the Basin in 1965 is approximately $59,000,000. The income from agriculture is about $9,000,000 or approximately 15.2 percent of the total income.

Counties in the Basin having National Forest lands, receive by law 25 percent of the receipts from sale of National Forest timber, forage, and other uses. The 25 percent return during the past five fiscal years was as follows:

Fiscal Year	Amount
1959-60	$100,166
1960-61	113,979
1961-62	92,122
1962-63	96,991
1963-64	96,323

Forest products sold had an average annual value of $348,000 over the years from 1959 to 1964.

OKLAHOMA DIVISION OF FORESTRY PHOTO

Charcoal kilns provide a ready market for low-grade hardwoods

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II. PRESENT USE OF RESOURCES

Lands in the Basin have been inventoried as cropland, pasture and rangeland, forest and woodland, and miscellaneous use. Much of the land may have other concurrent uses. In the agricultural census data and the Conservation Needs Inventory, some of the acres in other hay crops, improved pasture, and abandoned cropland were counted in the cropland estimates. The following tabulation lists the estimated acreages and percentages in each category:

Land Use	Acres	Percent
Cropland 1/	128,850	10.7
Pasture and Range	194,900	16.1
Woodland and Forest	827,440	68.5
Miscellaneous Use 2/	57,130	4.7
Total	1,208,320	100.0

1/Includes 63,555 acres of improved pasture and 12,859 acres of abandoned cropland grazed.

2/Includes urban areas, roads, railroads, strip mine spoil areas, parks, lakes, and stream channel areas.

Approximately 78 percent of the land is in private ownership, almost 1 percent is owned by the states of Oklahoma and Arkansas, and about 21 percent is Federally owned and located in the Ouachita National Forest and the Wister Reservoir area. Table 4 shows the estimated land use by ownership:

Table 4 - Land Use by Ownership - 1960
Poteau River Basin, in Oklahoma and Arkansas

Ownership	Cropland	Pasture & Rangeland	Forest & Woodland	Miscellaneous Use	Total
Private	128,850	181,300	588,845	47,530	946,525
State	-	-	8,350	1,050	9,400
Federal					
ONF	-	-	213,245	-	213,245
Wister	-	13,600	17,000	8,550	39,150
Total	128,850	194,900	827,440	57,130	1,208,320

The land areas were cataloged into capability classes by land use and are shown in table 5.

Table 5 - Capability Class and Land Use
Poteau River Basin, in Oklahoma and Arkansas

Capability Class	Cropland Acres	Pasture Acres	Forest Acres	Miscellaneous Acres	Total Acres
I	3,919	621	-	-	4,540
II	59,577	59,872	31,818	7,800	159,067
III	58,863	54,560	52,131	8,800	174,354
IV	4,516	37,845	21,663	3,500	67,524
V	683	6,343	28,021	550	35,597
VI	1,292	28,750	62,789	3,500	96,331
VII	-	6,909	631,018	15,606	653,533
VIII	-	-	-	2,000	2,000
Not Classified	-	-	-	15,374 1/	15,374
Total	128,850	194,900	827,440	57,130	1,208,320

1/ In miscellaneous use as urban, roads, lakes, etc.

PRESENT AGRICULTURAL ECONOMY EXCLUDING FORESTRY

Farm Characteristics

Number and Size of Farms - The number of farms decreased from 5,003 in 1940 to 2,573 in 1959. There was a decline of 303 farms, attributed to the change in farm definition in the Agricultural Census from 1954 to 1959. The average size of farms in the counties of the Basin has increased from 100.2 acres in 1940 to 223.2 acres in 1959. The trend of larger farms is continuing, and there are several large holdings.

Tenure and Ownership - About 52.8 percent of the Poteau River watershed is in LeFlore County, and in the 1959 Census of Agriculture there were 1,067 part-time farmers, 235 farmers who have retired from other professions, and of the 730 commercial farms in the county 478 had less than $5,000 gross income.

The following table shows the percentage of farms being operated by tenants in the counties that contain the Basin:

Table 6 - Proportion of Tenancy
Poteau River Basin, in Oklahoma and Arkansas

Year	Arkansas		Oklahoma		
	Scott	Sebastian	Haskell	Latimer	LeFlore
1940	44.0	40.6	68.0	51.0	57.8
1945	23.8	27.6	45.9	31.7	39.2
1950	14.5	19.5	31.2	24.8	23.6
1954	11.8	15.3	19.0	16.6	13.7
1959	9.0	14.0	14.3	9.6	9.4

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The following table gives the statistics of tenure and ownership of farms in the Basin counties.

Table 7 - Operations of Farms, Tenure by Complete Counties
Poteau River Basin, in Oklahoma and Arkansas

Year	Arkansas		Oklahoma			Total
	Scott	Sebastian	Haskell	Latimer	LeFlore	
			Farms Operated by Full Owners			
1940	673	1,123	381	488	1,268	3,933
1945	1,117	1,435	830	810	1,909	6,101
1950	977	1,238	834	635	1,903	5,587
1954	814	793	709	638	1,766	4,720
1959	682	1,095	489	498	1,404	4,168
			Farms Operated by Part Owners			
1940	192	298	207	92	379	1,168
1945	111	187	174	25	244	741
1950	116	227	327	150	443	1,263
1954	157	259	308	160	417	1,301
1959	134	168	274	139	394	1,109
			Farms Operated by Managers			
1940	-	3	9	4	12	28
1945	-	3	6	1	9	19
1950	-	5	8	2	11	26
1954	1	10	12	7	10	40
1959	1	12	5	4	6	28
			Farms Operated by All Tenants			
1940	681	977	1,269	608	2,268	5,803
1945	345	624	857	388	1,392	3,606
1950	186	357	531	259	728	2,061
1954	130	247	242	160	348	1,127
1959	81	159	128	68	187	623

Agricultural Land Use - The shift in type of farming has brought about a change in the use being made of the land until only 14.2 percent of the area, excluding Federally owned land in the Wister Reservoir area and the Ouachita National Forest, is in cropland.

From data collected in the field, from information in the Conservation Needs Inventory, and according to the best estimates derived from agricultural census data, cropland includes about 63,555 acres of improved pasture, 27,055 acres of other hay crops, and 12,859 acres of abandoned cropland. The above acreage is classed as cropland in the estimates made for the Basin study.

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Appendix table A1, page 118, lists the land use in four broad categories with the acreage estimated for each watershed by counties. Land use acreage by counties and states is tabulated in Appendix table A2, page 118. The acreage of land use estimated by class and subclass for cropland, pasture and rangeland, and forest and woodland is shown in Appendix table A3, page 119.

Farm Enterprises

Crops - An inventory of the acreage of crops grown in 1965 is shown in Appendix table A7, page 122. Cotton and corn were the two most important crops until 1940. During the peak years for these crops over 60,000 acres were in cotton and 80,000 acres devoted to the growing of corn. The combined acreage for these crops is about 3,350.

Livestock - The production of beef cattle is the major agricultural enterprise. Cattle numbers have increased since 1940 and are expected to continue in the future. The reduction in feed crop acreages has been followed with a decline in swine numbers. The production of sheep has never been important and is not expected to increase in importance. Horses on farms and ranches are being used to work cattle or for pleasure riding. There is some quarter horse breeding being done on a small scale. Some of the small owners are able to increase their incomes by combining poultry production and beef cattle to give year-round employment.

The dairy industry is of little importance; there are only eight dairy herds from 50 to 100 head in the total Basin at the present time.

Poultry - The poultry industry has continued to expand since 1954 and has become an important phase of the agricultural economy. Broiler production is the principal poultry enterprise, and the number sold has increased from 847,450 in 1954 to about 5,277,700 in 1965.

Agricultural Marketing and Income

The greater part of the agricultural income to the Basin is from livestock and livestock products. The total agricultural income in 1965 is approximately $9,125,312, and of this some 88 percent or $7,980,000 is from the sale of livestock and livestock products. In 1940, income from the industry was only about $888,570. There has been very little change in the value of all crops sold in 1940 in comparison to 1959. The value of these crops amounts to $409,206, which is 3.8 percent of the total agricultural income. The income from poultry and poultry products amounts to $560,605 in 1965; of this amount, $343,050 is net from broilers that are raised on contracts.

FORESTRY

Forest Land Characteristics

Forests are a mixture of pine, pine-hardwood, and hardwood forest types. (Plate 6 - Major Forest Types, follows page 26.) They cover 827,400 acres or 68 percent of the Basin.

Except for portions of what is now the Ouachita NF in Arkansas, the original stand of timber was largely liquidated by sawmills and other timber industries between 1910 and the late 1920's. The present forest consists principally of new growth established since then, with a small amount of residual timber. Pine and oak-pine types, with 25 percent or more of pine, and with shortleaf pine predominating, occupy 47 percent of the commercial area. Oak-hickory, or upland hardwood types, occupy 48 percent. Oak-gum-cypress, or bottomland hardwood types, occupy 5 percent.

U. S. FOREST SERVICE PHOTO

Shortleaf pine stand in Ouachita National Forest

In the pine and oak-pine types, sawtimber stands occur on 25 percent of the acreage, poletimber stands are on 39 percent, and seedling-sapling stands occur on 36 percent.

In the hardwood types, all the type acreage is in poletimber and smaller stand sizes. A large proportion of the residual larger trees are either unsound or limby and rough and not of commercial quality.

Table 8 lists the acres of forest types by stand size.

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Table 8 - Commercial Forest Land by Forest Types and Stand Size
Poteau River Basin, in Oklahoma and Arkansas

Stand Sizes	Forest Types				
	Pine	Oak Pine	Oak Hickory	Oak-Gum Cypress	All Types
	(Thousand Acres)				
Large Sawtimber	17.6	-	-	11.2	28.8
Small Sawtimber	71.6	5.6	-	-	77.2
Poletimber	98.2	50.5	174.0	16.8	339.5
Seedling-Sapling	40.9	97.8	213.4	5.6	357.7
Nonstocked & Other	-	-	6.5	5.6	12.1
All Stand Sizes	228.3	153.9	393.9	39.2	815.3

Timber Inventory

The current timber inventory is 704 million board feet in sawtimber trees; and the total good-tree, or growing stock volume, including sawtimber, is just over 3 million cords. There is an additional volume of something over a million cords in cull trees and in hardwood limbs, but this material is mostly below current utilization standards. Timber inventory is shown in Table 9.

Of the sawtimber volume, 510 million board feet are in pine, and 191 million board feet are in hardwoods. The growing stock inventory has 1,760 thousand cords in pine and 1,333 thousand cords in hardwoods. There is, in addition, a minor occurrence of other softwoods, that is, red cedar and cypress.

The pine inventory is almost entirely shortleaf pine. Three-quarters of the board foot volume is in small sawtimber trees between 9 and 14 inches at breast height.

The hardwood inventory is almost two-thirds in oaks. More than four-fifths of the board foot volume is in the lowest grade of standard lumber logs and in tie-and-timber logs.

Growth and Timber Cut

Current annual net growth of timber is 42 million board feet in sawtimber and 201 thousand cords in growing stock, figure 2. Growing stock trees are sawtimber trees, poletimber trees, saplings, and seedlings--all live trees except culls.

The average annual cut over the past five years has been 16 million board feet in sawtimber, and 60 thousand cords in growing stock.

Table 9 - Timber Inventory on Commercial Forest Land
Poteau River Basin, in Oklahoma and Arkansas

Species	Sawtimber	Total Growing Stock, Including Sawtimber			Other Material	
		Total	Sawtimber Trees	Poletimber Trees	Cull Trees	Hardwood Limbs
	(Million Bd. Ft.)	(Thousand Cords)				
Softwood:						
Southern Yellow Pines	510	1,760	1,269	491	27	-
Other Softwoods	3	13	8	5	-	-
Total Softwood	513	1,773	1,277	496	27	-
Hardwood:						
White Oaks	83	587	243	344	464	113
Red Oaks	39	253	120	133	107	44
Hickory	11	200	33	167	121	17
Sweetgum and Blackgum	32	160	95	65	56	12
Other Hardwoods	26	133	76	57	116	20
Total Hardwood	191	1,333	567	766	864	206
All Species	704	3,106	1,844	1,262	891	206

The softwood cut has been 59 percent for lumber; 39 percent for commercial posts, poles, and pulpwood; and 2 percent for fuelwood and other domestic use. The hardwood cut has been 46 percent for lumber and railroad ties, 6 percent for other commercial products, and 48 percent for fuelwood and other domestic use.

The substantial surplus of growth over cut is reflective of several circumstances. A greater part of the forest stands are in a depleted condition insofar as sawtimber-sized trees are concerned; however, by 1980 the sawtimber inventory is expected to increase by nearly 50 percent. Most of the hardwood inventory and growth are in stands where the trees are predominantly of small size or low quality and therefore not attractive for commercial operation. The forest lands that are in better condition are largely on the National Forest and on the comparatively small forest industry acreage, where conservative management and cutting are being practiced. There also has been a sharp decline in pine pulpwood production from that of 7 years ago and earlier, because of changes in the pattern of pulp industry wood procurement.

Consequently, the seemingly large margin of growth over cut should be viewed more as a constructive force that is building up the forests in the area than as an indication of immediate opportunity for additional industrial development.

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Ownership of Forest Land

The commercial forest land in the Basin is 28 percent in public ownership and 72 percent private ownership. Of the 230,000 acres of commercial forest in public ownership, 210,000 acres are in the Ouachita National Forest; an estimated 17,000 acres are held by the Corps of Engineers in connection with operation of Wister Reservoir; and the State of Oklahoma has 3,100 acres.

U. S. FOREST SERVICE PHOTO

Over one-fourth of the forest land in the Basin is within the Ouachita National Forest

The 585,000 acres in private ownership are divided about one-third in farm ownership and two-thirds in other private ownership, with forest industry owning 22,000 acres, shown in Table 10.

Forest Management and Protection

Aside from National Forest and a relatively small acreage of managed forest industry lands, there is little management of privately owned forest land in the Basin area according to long-term forestry principles.

Ouachita National Forest lands in the Basin include most of two ranger districts; the Poteau District with headquarters at Waldron, Arkansas, and the Choctaw District at Heavener, Oklahoma, and portions of three other districts: Mena, Kiamichi, and Cold Springs. These lands are administered by the U.S. Forest Service under a broad, multiuse policy for recreation, range, timber, watershed, and wildlife.

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Table 10 - Commercial Forest Land by Class of Ownership
Poteau River Basin, in Oklahoma and Arkansas

Class of Ownership	Thousand Acres	Percent
Public		
National Forest	210.2	25.8
Other Federal	17.0	2.1
State	3.1	0.4
	230.3	28.3
Private		
Forest Industry	22.2	2.7
Farm	192.8	23.6
Other	370.0	45.4
	585.0	71.7
All Ownerships	815.3	100.0

1/ Commercial-reserved not included in estimates.

Table 11 - Ownership of Timber Inventory
Poteau River Basin, in Oklahoma and Arkansas

Ownership Class	Sawtimber			Growing Stock, Including Sawtimber		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood
	(Million Board-Feet)			(Thousand Cords)		
Public						
National Forest	444	410	34	1,545	1,343	202
Other Public	7	2	5	40	7	33
Total Public	451	412	39	1,585	1,350	235
Private						
Forest Industry	47	46	1	208	201	7
Farm	96	neg.	96	602	8	594
Other	110	55	55	711	214	497
Total Private	253	101	152	1,521	423	1,098
All Ownership	704	513	191	3,106	1,773	1,333

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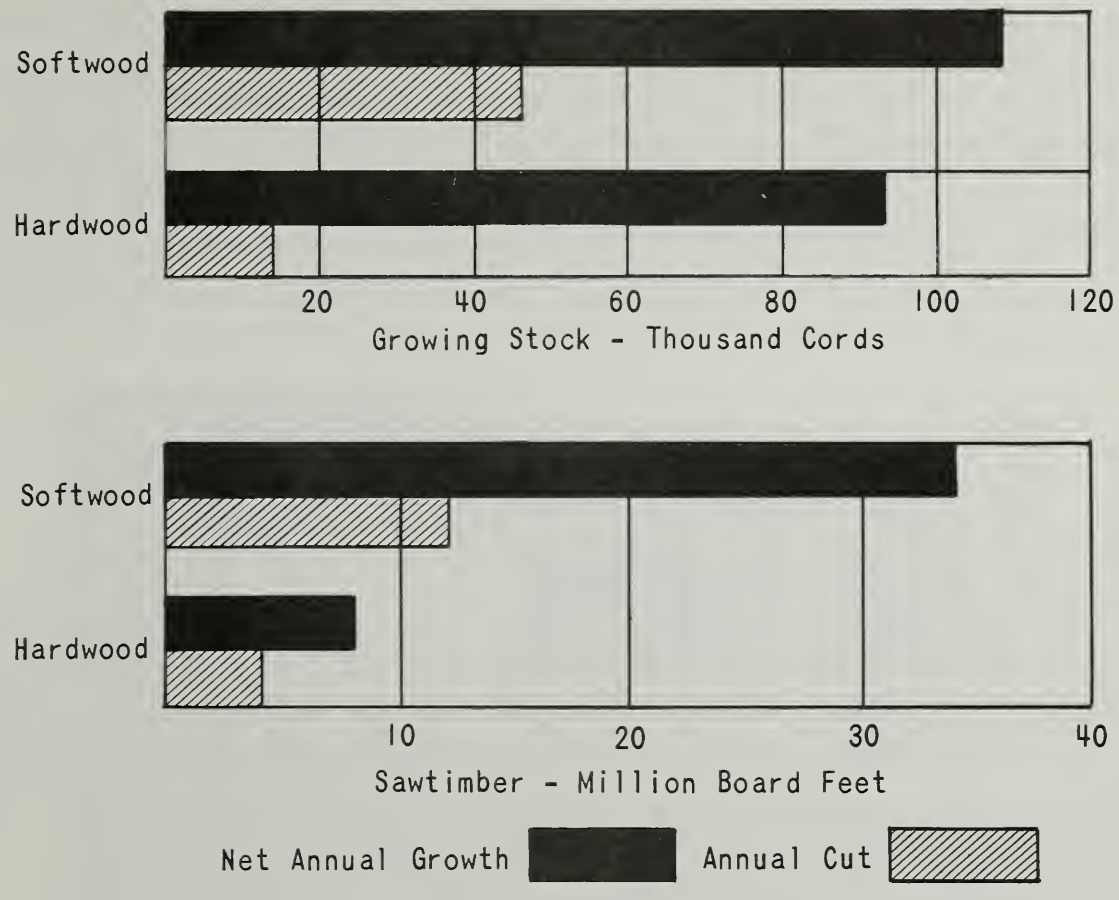

Figure 2 - Relationship of Growth to Annual Cut
of Growing Stock and Sawtimber
Poteau River Basin, in Oklahoma and Arkansas
1962

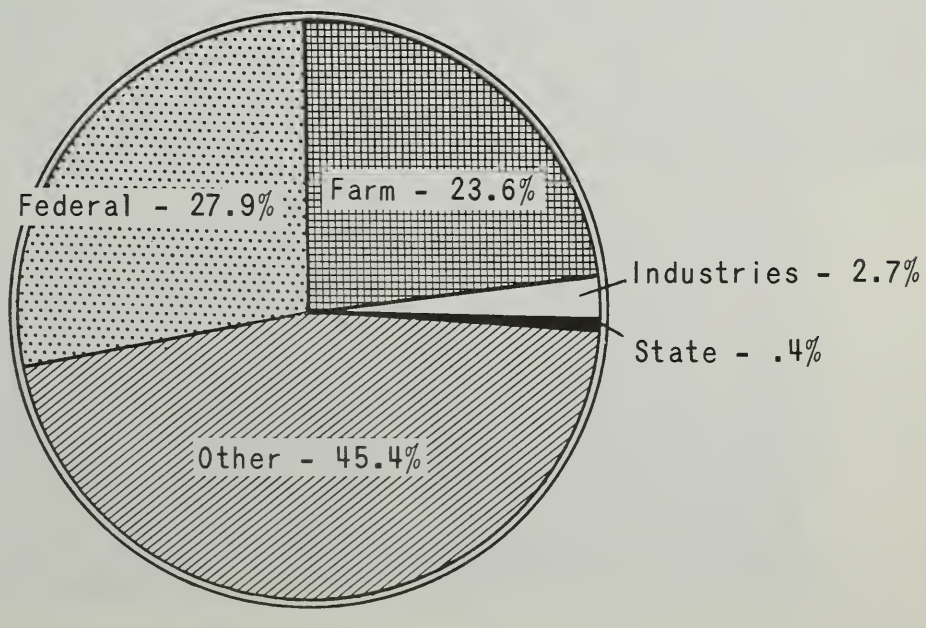

Figure 3 - Present Ownership of Commercial Forest Land
Poteau River Basin, in Oklahoma and Arkansas

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The State Forestry organizations of Arkansas and Oklahoma in cooperation with the Forest Service provide fire protection to State and privately owned forest lands in the Basin. A limited program of management assistance is limited to advising and instructing landowners regarding good forestry and timber harvesting practices, with actual execution of such practices being left up to the landowners. The Arkansas Forestry Commission has three management assistants working in the area, and the Oklahoma Division of Forestry has two. Both States operate forest nurseries for supplying forest planting stock at or near cost. The State forestry activities are financed by State, Federal, and privately contributed funds.

SOIL CONSERVATION SERVICE PHOTO

Planting shortleaf pine seedlings

SOIL CONSERVATION SERVICE PHOTO

Four-year old pine trees

WATER RESOURCES IN THE BASIN

Surface Sources

Average precipitation in the Basin ranges from 40 to 45 inches. The runoff will vary between tributary watersheds from about 13.7 to 15.3 inches. The overall average runoff is approximately 14.0 inches. In a critical drought period, the gaged runoff for the year 1956 amounted to less than 3.0 inches. Gross lake evaporation amounts to about 46 inches. The annual yield to surface streams is estimated at 1,410,000 acre-feet or about 1,260 MGD for the Poteau River and tributaries.

SOIL CONSERVATION SERVICE PHOTO

Farm pond with well vegetated dam

It is estimated that there are 4,000 farm ponds with a total capacity of 5,000 acre-feet. There are several lakes, the largest being Wister Reservoir, a Corps of Engineers project. The only major stream which furnishes a dependable water supply is the Poteau River, which is supplied water from Wister Reservoir for low flows.

For the surface sources the water is of exceptional quality. Only in isolated instances are these sources being contaminated from old mines, strip mine areas, and other sources.

Ground Water

Underground sources of water are quite variable, depending on the location. In most areas, limited amounts of water can be supplied from wells and generally are adequate for domestic supply. Deep wells which produce sizable amounts of water occur only in isolated areas. The quality of water varies with the location, with some areas producing poor quality water. It is estimated that only a small part of the available water supply is from underground sources.

Major Uses

Agriculture - The major agricultural use for water in the Poteau River Basin is for livestock. Farm ponds, creeks, springs, and wells supply most of the water for livestock and rural domestic use. A few wells are dug by hand, but most of them are drilled by machines. It is estimated that 1,000 acre-feet are needed for livestock. Irrigation is not practiced in any volume in the area. The rainfall, averaging from 40 to 45 inches, generally is adequate for most of the crops being grown. There are a few irrigation systems, generally of the sprinkler type, being used by farmers. Most of the irrigation is on small plots used for raising truck and vegetable crops. Water supply for this use is furnished by wells, ponds, strip mine pits, and streams. The quality of water usually is suitable for this use; however, the quantity is limited in most cases.

Municipal and Industrial - Water supplies needed for municipal uses are from a variety of sources. The water supply for Heavener, Oklahoma, is furnished by the Wister Reservoir. Poteau and Panama, Oklahoma, take water from the Poteau River with low flows furnished by the storage of water in the Wister Reservoir. Reservoirs have been constructed for municipal water supplies by the following cities or towns: Bokoshe, Spiro, and Wilburton in Oklahoma, and Mansfield and Waldron in Arkansas. City-owned wells are used for water supplies for Hackett and Hartford, Arkansas. Red Oak takes water out of a coal strip mine for its water supply. A low water dam on Caston Creek furnishes the water supply for Wister. Arkoma's water supply is from Fort Smith. Residents use private wells and the towns and communities which do not have water systems are: Cameron, Hodgen, Howe, McCurtain, Monroe, Shady Point, and Pocola, Oklahoma; and Bates, Bonanza, Huntington, and Midland, Arkansas.

The wood-using industries within the Basin are nominal users of water. In lumber manufacturing, water requirements are related to the size and type of mill and to the variety of manufacturing facilities. Large mills with a steam power plant, dry kilns, shop, and remanufacturing facilities have the highest water requirement. Smaller mills with dry kiln and planer facilities have a smaller requirement, and small, semi-portable mills have a very small requirement. Veneer plants require a limited amount of water for use in log-soaking vats, in addition to the requirement for steam and other purposes. Wood-preserving plants have a requirement for steam in connection with the wood-treating process. Water requirements of other primary and secondary wood industries are for steam and other usual purposes and ordinarily are minor. A list of water requirements of wood processing industries is shown in Appendix table A10, page 127.

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Recreation - Water for recreational uses is being furnished by most of the tributary creeks, by the Poteau River, and by several lakes. Lakes located in the Basin which have high recreation use are Wister Reservoir, a Corps of Engineers structure; Sugarloaf Lake, located 15 miles south of Fort Smith; Cedar Lake, in the Ouachita National Forest; and Lake Carlton, in Robbers Cave State Park near Wilburton. The following lakes, including surface acres, are being used chiefly for recreation: Carter, 10; Cavanaugh 15; Cedar, 93; Clear, 10; Long, 50; Poteau, 10: Spiro, 60; Sugarloaf, 200; Terrell, 48; Wofford, 10.

SOIL CONSERVATION SERVICE PHOTO

Black Fork Creek near Zoe, Oklahoma

Fish and Wildlife - The streams and lakes furnish habitat for fish and watering places for wildlife. The 4,000 farm ponds in the Basin not only will provide water for livestock but will furnish habitat for fish and watering places for wildlife. There are also some strip mines which furnish water for fish and wildlife.

RECREATION IN THE BASIN

Recreation on Agricultural Land

There is little use being made of private lands for income-producing recreation at the present time; however, the potential to develop income-producing recreation on farms and ranches is excellent. Attempts have been made by few landowners and operators to develop facilities for camping or picnicking

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around abandoned strip mine pits, farm ponds, or streams. A few have charged a small fee for fishing. These enterprises have been small, the facilities meager, and they have had poor management.

State Parks

There are three State parks located within the Basin. A description of these parks is in Appendix, page 159. These State parks and the Cedar Lake recreation area in the Ouachita National Forest furnish most of the recreational opportunities. The parks are well distributed, with Robbers Cave State Park located in the western area, Wister State Park in the central area, and Queen Wilhelmina State Park in the southeastern area. A tabulation of the facilities offered at the parks is in Appendix, page 160.

U. S. FOREST SERVICE PHOTOS

Camping and boating at Cedar Lake in Ouachita National Forest

Recreation on Ouachita National Forest Lands

Soil and water management, timber harvesting, wildlife habitat development, and general forest recreation are the principal resource activities within the Ouachita National Forest area. Primary-use areas occupy a relatively small part of the total forested area, but these are important to the multi-use concept. An example of these are the developed recreational sites being maintained for general public use.

The following tabulation shows the developed recreational sites in the Ouachita National Forest:

Name	Acres	Use	Capacity 1/
Old Military Road	3	Picnic	20
Bear Caves	1	Picnic	20
Sycamore Tower	1	Observation & Picnic	10
Horsethief Springs	1	Picnic	20
Cedar Lake	20	Camp	450
Cedar Lake	6	Picnic	145
Cedar Lake	4	Beach & Swimming	150
Cedar Lake	84 2/	Boating & Fishing	-
Pipe Springs	1	Picnic	15
Poteau Mountain Tower	4	Picnic	10
Rich Mountain Tower	1	Picnic	20

1/ Number of people that can use the facility at one time.

2/ Cedar Lake has 84 surface acres.

Cedar Lake is shown on the cover of this report. Recreational sites at this lake have been developed by the U.S. Forest Service.

III. LAND AND WATER RESOURCE PROBLEMS

AGRICULTURAL DAMAGES

Floodwater

Flooding is widespread and often damaging in the Basin. Floods occur frequently on the tributaries of the Poteau River, causing moderate to severe damages to growing crops, pastures, fences, and water gaps. Losses of livestock and damage to farm property are frequent. A larger number of the floods occur during the spring growing season. The flood hazard has been a contributing factor in accelerating the land use change from the production of feed crops such as corn, alfalfa, and grain sorghums to pastures. Improved and native pastures cannot reach their full potential because of flooding. Owners and operators hesitate to increase the use of fertilizer, better varieties of forage crops, and other inputs, since in many instances they are not able to harvest additional forage. During the spring months, when the pastures are producing the heaviest forage, the flood threat is greatest, and livestock producers hesitate to keep cattle on the flood plain lands because of the chance of livestock being drowned.

The Wister Reservoir, built by the Corps of Engineers in 1948, reduces damages to the main stem flood plain of the Poteau River. Severe flooding is less frequent on the flood plain of the Poteau River than on the tributaries. When floods do occur, the damage is often severe and losses to agricultural properties are heavy.

Table 12 shows the agricultural damages in monetary terms for each tributary watershed and study area.

The damages to the main stem flood plain of the Poteau River and Brazil Creek below the proposed Corps of Engineers structure were obtained from the Corps of Engineers, Tulsa, Oklahoma, District Office.

Erosion

Erosion of upland is not a major problem. The main source of sediment is sheet erosion from former cultivated land, from steep mountainous areas with insufficient cover, and from burned-over pasture and woodland.

There are no critical sediment source areas that need project-type action. Land use changes in recent years have reduced upland erosion. There has been a trend toward establishment of tame pasture and improved management of the woodland. Upland erosion has been partially responsible for the change from cultivated fields to improved pastures on upland soils.

Based on studies made on Caston-Mountain and James Fork creeks, together with already existing Public Law 566 projects on Fourche Maline and Poteau River watersheds, approximately 92 percent of the sediment produced from upland areas results from sheet erosion. Gully and road erosion produce about 5 percent and streambank erosion about 3 percent. The average annual rate of erosion on the upland is 2.4 tons per acre or 0.83 acre-foot per square mile. Flood plain erosion (scour) has damaged 35,964 acres of flood plain soil.

Table 12 - Agricultural Damages 1/
Poteau River Basin, in Oklahoma and Arkansas

Study Areas	Average Annual Damages (dollars)
Poteau River	102,538
Fourche Maline Creek	131,588
Caston-Mountain Creek	14,387
Black Fork Creek	59,254
Combined Creeks	26,055
James Fork Creek	96,700
Brazil Creek (Above Brazil Reservoir)	46,229
Subtotal Damages - Estimated by USDA	476,751
Brazil Creek (Below Brazil Reservoir) 2/	77,520
Main Stem Flood Plain 2/	568,650
Subtotal Damages - Estimated by Corps of Engineers	646,170
Total Damages	1,122,921

1/ Price Base: Long-term prices projected by USDA, ARS-AMS, September 1957.
2/ Present-day prices.

SOIL CONSERVATION SERVICE PHOTO

Floodwater damage on cropland

In terms of productivity losses, the following table indicates the acres damaged in existing Public Law 566 projects and watersheds with Public Law 566 potential.

Table 13 - Erosion (Flood Plain Scour) Damages
Poteau River Basin, in Oklahoma and Arkansas

Study Areas	Percent Damaged					Total
	10	20	30	40	50	
			(Acres)			
Poteau River	2,138	791	527		108	3,564
Fourche Maline Creek	1,078	359	180	126	54	1,797
Caston-Mountain Creek	1,223	356	127	75		1,781
Black Fork Creek	2,051	697				2,748
Combined Creeks	1,590	552	50			2,192
James Fork Creek	3,089	1,007	143			4,239
Brazil Creek 1/	1,133	600	221			1,954
Main Stem Flood Plain	11,749	4,489	1,451			17,689

1/ Acres indicated are upstream from the contour of the Corps of Engineers Brazil Reservoir.

The hazards from flood plain scour have caused a change in the majority of the flood plain from high value crops to tame pasture. When flooding is reduced, the productivity of the soil can be restored by the use of good soil management practices.

Channel erosion is not a serious problem. Most of the tributary channels are aggrading slowly with gravels and cobbles. The main stem has some bank cutting, but the channel bottom is stable.

Sediment

Most of the channels of the Poteau River tributaries are filling slowly with sediment. There has been a slight loss of channel capacity, but the problem has not reached serious proportions. There has been only minor swamping on the Poteau River and the flood plain of its tributaries as a result of sediment deposits.

Sediment deposition has damaged 9,546 acres of flood plain soil. Table 14 indicates the acres damaged by sediment on existing Public Law 566 projects and watersheds with a Public Law 566 potential.

Substantial reduction in sediment damage has occurred on the existing Public Law 566 projects that have land treatment and structures in place.

NONAGRICULTURAL DAMAGES

The Poteau River and its tributary flood plain lands sustain severe damages to nonagricultural property when large floods occur. The nonagricultural property includes such items as homes, commercial establishments, public

buildings, utilities and services, streets, railroads, Federal highways and bridges, State highways and bridges, and County roads and bridges.

Table 14 - Sediment Damages
Poteau River Basin, in Oklahoma and Arkansas

Study Areas	Percent Damaged				Total
	10	20	30	60	
			(Acres)		
Poteau River	1,903	1,268			3,171
Fourche Maline Creek	11			92	103
Caston-Mountain Creek	140	117	45		302
Black Fork Creek	942	153	76		1,171
Combined Creeks	277	67			344
James Fork Creek	867	208			1,075
Brazil Creek	302				302
Main Stem Flood Plain	2,616	462			3,078

The estimated average annual nonagricultural damages are $234,425, divided into tributary watersheds and study areas as follows:

Table 15 - Nonagricultural Damages 1/, by Study Areas
Poteau River Basin, in Oklahoma and Arkansas

Study Areas	Average Annual Damages
	(dollars)
Poteau River	42,776
Fourche Maline Creek	14,289
Caston-Mountain Creek	24,460
Black Fork Creek	3,490
Combined Creeks	2,550
James Fork Creek	9,551
Brazil Creek (Above Brazil Reservoir)	9,547
Subtotal Damages - Estimated by USDA	106,663
Brazil Creek (Below Brazil Reservoir) 2/	8,342
Main Stem Flood Plain 2/	119,420
Subtotal Damages - Estimated by Corps of Engineers	127,762
Total Damages	234,425

1/ Price Base: Long-term prices projected by USDA, ARS-AMS, September 1957.
2/ Present-day prices.

Total average annual flood damages for both agricultural and nonagricultural amount to $1,357,346.

SOIL CONSERVATION SERVICE PHOTO

Tributary flooding causing damage to highways and inconvenience to travel

AGRICULTURAL WATER MANAGEMENT

Inadequate Agricultural Water Supply

The principal problem of agricultural water supply is the seasonal shortage of water for livestock. Many streams, springs, and wells used for this purpose cease to flow during the summer months or during drought periods. This creates a problem for grazing management.

Bottomland soils suitable for irrigation are in small irregular areas and are not extensive. These areas are generally located in the lower reaches on the main stem and in the upper sections of the tributaries near the stream channels. Opportunities for group irrigation projects are not feasible.

Drainage Conditions

There is an extensive problem for drainage of the flood plain lands of the main stem and tributaries. All of the Lee soils and about 20 percent of the Pope and Philo soils located on the main stem and tributary flood plair will need drainage. Of the 42,200 acres of main stem flood plain, about 14,000 have a drainage problem and about 12,600 acres on the tributary floc plain will need drainage. Practically all the soils that need drainage are generally being used for pasture and hay production. The need for group drainage projects will not be significant in most cases and, when needed,

will involve only three to five landowners for each project. Adequate outlets for drainage systems usually are available. Thirty-six to 48-hour drainage will be suitable for many of the systems; however, when legumes are included in the crops, 24-hour drainage is recommended. The maintenance of the drainage systems usually will not be extensive since siltation is not a problem.

The elimination of prolonged flooding on the tributary flood plain as well as the main stem is a prerequisite to successful drainage. There are 111,300 acres of flood plain lands in the Basin, which include 26,600 or about 24 percent of the soils that need drainage.

The following tabulation lists the acreage of bottomland soils in each tributary watershed and on the main stem which have been a drainage problem, the acreage on which drainage measures have been installed, and the acreage needing drainage measures.

Watersheds and Study Areas	Acreage With Drainage Problem	Acreage With Drainage Installed	Acreage Needing Drainage
Poteau River	2,500	200	2,300
Fourche Maline	2,000	100	1,900
Caston-Mountain	600	200	400
Combined	1,200	350	850
James Fork	2,800	850	1,950
Brazil	3,500	1,050	2,450
Main Stem	14,000	3,000	11,000
Total	26,600	5,750	20,850

Other Problems

Domestic water supply needs, when not available from wells, are secured from surface sources using filter systems. In many areas, when wells are used for domestic water supply, there is a need for the water to be filtered for sulphur and iron content. Water supplies for domestic use usually are depleted during extended drought periods, and in many areas there are seasonal water shortages.

NONAGRICULTURAL WATER MANAGEMENT

Inadequate Water Supply Facilities

Inadequate water supplies for communities, fish and wildlife developments, outdoor recreation, and enhancement of unique areas of great natural beauty are some of the chief problems in the development of the water resources in the Basin.

Municipal and Industrial - Water resources influence all segments of the economy. Industrial growth has been limited by inadequate water supplies. Community existence and growth are dependent on good quality for domestic and municipal use. Cities and towns which take water from Wister Reservoir or from the Poteau River, and towns which have recently constructed reservoirs,

have adequate water supplies for municipal uses. Water supplies for many of the other towns and communities are inadequate, especially during summer months, and become critical during drought periods.

The requirements of water supplies for industrial uses are limited, with the needs being furnished by municipally owned systems. A poultry processing plant located in Waldron, Arkansas, uses rather sizable amounts of water; however, there are no heavy water-using industries such as pulp and paper manufacturing, oil refining, steel manufacturing, or steam power plants. Underground sources of water for municipal or industrial uses are limited, and there are no surface sources at present, except Wister Reservoir, which could furnish adequate supplies to a heavy water-using industry.

In general, it can be concluded that most of the towns and communities which depend on water from underground sources have summer season water shortages, and conditions become severe during drought years. The following towns and communities have inadequate water supply for municipal uses and have indicated an interest in developing additional sources: Howe, McCurtain, Cameron, Pocola in Oklahoma; and Hartford, Huntington, Hackett, Mansfield, and Midland in Arkansas.

SOIL CONSERVATION SERVICE PHOTO

Land drainage is needed to remove excess water from this field

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Recreational Water Supply - The present demand for water for recreational uses in terms of surface areas is difficult to determine. Water in streams and in surface impoundments serves as a habitat for fish and wildlife and for other recreational uses. Fishing and hunting furnished food for the early settlers but in more recent years have become recreational activities. Demand is increasing for impoundments with large surface areas for motor boating, water skiing, swimming, and other water sports. These pressures will continue to increase because of more leisure time, increased incomes, and improved means of transportation.

In other areas, statistics indicate that the demand for water-based recreation is greater than the supply. It is estimated that this region will reach this condition in a few years. Since a part of Fort Smith, Arkansas, is in the Basin, the demand has increased for recreational water supplies in this area, and it is expected that the pressures will continue to increase as the population grows and technologies improve.

Fish and Wildlife Water Supply Storage - Practically all the streams cease to flow during the summer season and during drought periods. This has a marked effect on fish propagation and a somewhat lesser effect on wildlife. With many of the streams completely dry during the summer months and the larger tributaries reduced to only water holes instead of flowing streams, the quality of fishing has gradually declined.

SOIL CONSERVATION SERVICE PHOTO

Tributary stream reduced to water holes in the summer

In areas which have been strip mined for coal, there usually are suitable water supplies for fish habitat and watering places for wildlife. The water in some of the strip mines is not suitable because of acid condition or a high content of minerals.

Farm ponds usually furnish a dependable water supply for fish and wildlife; however, during extreme drought conditions many ponds become dry. Some ponds have been stocked with fish, but most of them need more intensive management.

Water Quality

The USDA investigation on water and related land resources was concerned principally with the agricultural aspects. The U.S. Department of Health, Education, and Welfare is currently making a study which will provide detailed and up-to-date information about the pollution and public health aspects of the water quality of the streams in the Basin. No attempt has been made to evaluate these factors in this report except in a general way and for water supplies for rural domestic use.

FOREST RESOURCE PROBLEMS

Present stand conditions are direct reflections of past history and, in the case of small woodland owners, lack of economic incentive to manage their forest lands.

Between 1910 and the late 1920's most of the original stands of timber were cut off the forested lands. In many areas fires and overgrazing followed, further depleting the forest. In addition, road systems, power line rights-of-way, and strip mining have contributed to the water management problems on these lands.

Forest lands acquired in the 1930's for the Ouachita National Forest have shown a considerably better recovery than most of the private forest land in the Basin. These National Forest lands are managed and protected by the U.S. Forest Service. Private forest lands in the Basin are under organized fire protection by the State Divisions of Forestry of Arkansas and Oklahoma in cooperation with the U.S. Forest Service. Management assistance is available on request from these same Forestry Divisions. This assistance is limited mainly to advice on practices to follow. Through the Agricultural Conservation Program, the Federal Government will share costs with the private landowner for tree planting and timber stand improvement.

The lack of economic incentive is the primary reason for the poor management given to small tracts. The problems associated with improper management include the following:

1. General lack of saleable timber (small size classes, poor quality of poor species).

2. The grazing of these tracts and burning to "green up" the grass destroys or degrades considerable timber.

4. Average forest acreage per landowner is small. Financial returns of any consequence usually are many years apart.

5. Availability of markets or marketing facilities.

6. When placed under management, many areas will require long periods of time before any returns can be realized.

Stand Conditions

Practically all the forest land in the Basin is capable of growing timber of commercial quality, but the present inventory is considerably less than the long-term capability of the land. National Forest lands (about 26 percent of the total commercial forest lands) include almost three-fourths of the pine-type acreage in the Basin and over four-fifths of the sawtimber acreage. On the National Forest lands, 84 percent is in pine type and 16 percent in oak-pine and hardwood forest types. Sawtimber makes up 41 percent of the stands, 47 percent is in poletimber, and 12 percent is in seedling-sapling.

Lands in ownership other than National Forest are 69 percent in hardwood types, 23 percent in oak-pine types, and only 8 percent in pine types. Sawtimber makes up only 3 percent of the stands, poletimber 40 percent, 55 percent is in seedling-sapling stands, and 2 percent is nonstocked.

Eighty percent of the pine board foot volume and 76 percent of the pine growing stock volume is found on National Forest lands. In contrast, 82 percent of the hardwood board foot volume and 85 percent of hardwood growing stock volume is found on ownership other than National Forest.

Figure 4, page 60, shows a comparison of the sawtimber and growing stock inventory by class of ownership.

This timber inventory is considerably less than the long-term capability for tree growth. On the National Forest lands, the current inventory averages at perhaps 40 percent of eventual objectives, but on other ownerships the average is nearer one-fifth or one-sixth of the long-term capability. The differences in type, size, class, and volume, between National Forest lands and other ownerships are due largely to management. As mentioned previously, aside from National Forest lands and a relatively small acreage of managed forest industry lands, there is little management practiced on privately owned forest land in the Basin.

Hydrologic Conditions

The forested lands in the Basin have an important role in absorbing water and retarding runoff during rainstorms. Hydrologists have long recognized the effect of management on the ability of the forest and forest soils to perform this characteristic. The relative effectiveness of these areas to perform this function is termed "hydrologic conditions" and relates directly to streamflow, runoff, flooding, and sedimentation.

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U. S. FOREST SERVICE PHOTO

Fire destroys watershed cover

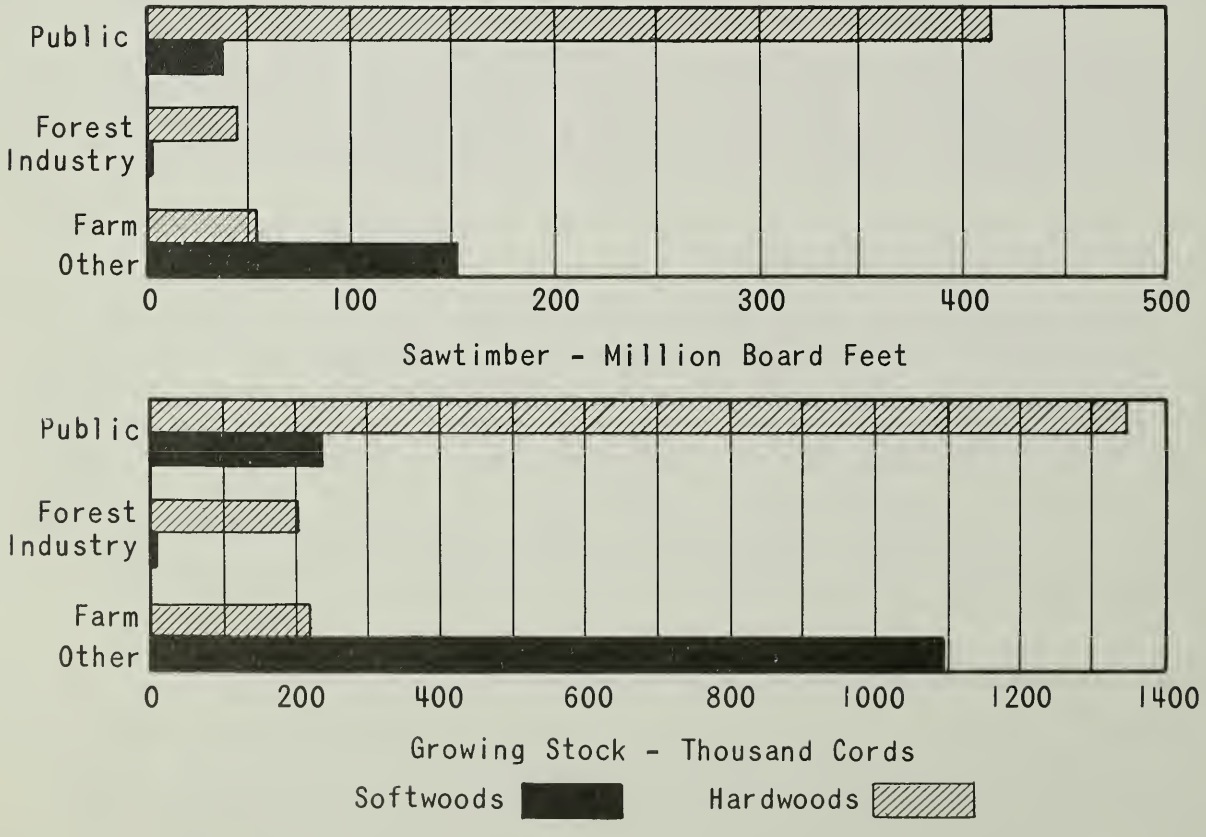

Figure 4 - Comparison of Sawtimber and Growing Stock Volume by Class of Ownership Poteau River Basin, in Oklahoma and Arkansas

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The effect from a history of abuse from poor cutting practices, fires, and overgrazing is reflected in low wood production and poor hydrologic conditions on these lands. Much of the forest cover is making less than adequate contribution to the protection of the watersheds and a reduction to rapid runoff. As a result of the poor conditions, there is less infiltration of water into the soil and higher peak flows and flood damages. This results in seasonal low flows and drying up of streams described on page 57.

U S FOREST SERVICE PHOTO

Overgrazing is a misuse of land resources

National Forest and forest industry lands exhibit better hydrologic conditions than the average private lands as shown in the following tabulation:

Hydrologic Condition Class	National Forest & Forest Industry (Percent)	Other Ownerships (Percent)
Very Good	1	-
Good	4	1
Fair	23	6
Poor	57	25
Very Poor	15	68

These marked differences in hydrologic conditions, obtained in a comparative short period of management, indicate an inherent capability of the land to recover its absorptive and storage characteristics.

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Forest Range

Keeping livestock in the forest has been a long-time custom in the Basin. Overgrazing and burning have nearly eliminated the forest as a forage producer for livestock; consequently more and more farmers are turning to improved pastures as a source of forage.

Agricultural agencies, livestock associations, and others interested in livestock production are emphasizing the need to develop improved, highly productive, fenced pastures. This effort toward improved pasture is important to the farmer, to the livestock industry, and to the forest resource.

ECONOMIC DEVELOPMENT

Fluctuation of Crop Yields and Farm Income

The historical agricultural information on the major crops by counties, within the Basin, shows that the acreage of cultivated crops has continued to decline for the past several years, with a corresponding increase in pasture acreage. The information also shows that there has been a fluctuation in cultivated crop yields from year to year for this same period. This condition has been aggravated by the frequency of flooding on flood plain lands in the Basin.

Low farm income, unemployment, and underemployment are the major critical problems of the agricultural economy. LeFlore County, Oklahoma, contains the largest land area of the five counties involved. In 1960 there were 730 commercial farms in the county; of these, 241 had incomes of less than $2,500, and 478 had incomes of $2,500 to $5,000. This is over 65 percent of the farms classified as commercial farms having a gross income of less than $5,000.

The high cost of items used in production and variable prices received by farmers for farm products has created a price-cost squeeze that tends to hold down net family income and restrict the expansion of farm units. The lack of capital, small operating units, and low incomes result in a much slower adaptation of modern technology which, in itself, contributes to low incomes.

Few of the farms are of economical size to provide an adequate income without off-farm employment. Off-farm employment is both a benefit and hindrance to the farming economy. Small operators are able to supplement their farm income, but pursuing off-farm income allows the operator little time to take advantage of new technology or maintain his buildings and land. A gradual deterioration of the farm unit results.

Soil and Water Resources

The full potential of the soils has not been developed in all areas. Abandoned cropland, which has been reseeded naturally, needs rehabilitation from damage by erosion that occurred during the years of cultivation. Improved pastures should be established on these areas. This would decrease damage from erosion and increase forage production. Overgrazing has been a problem,

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and these areas have been invaded by less desirable species of plants. Increased production of forage could be attained with proper management and use.

There are areas that have a cover of undesirable or low quality timber stands. This condition exists because of past cutting practices, burning, and overgrazing.

Of the total flood plain area (111,300 acres), 26,600 acres or 24 percent need drainage. These problem areas are identified by imperfectly drained, or poorly drained, nearly level to undulating soils of the bottomlands. These soils are subject to stream overflow and surface ponding from water that has accumulated from side hill drainage. Works of improvement to remedy this situation would increase the productivity of these soils.

Irrigation of cultivated crops on a large scale is not feasible because of the soil types. However, in small areas near the streams, irrigation of cultivated crops is feasible.

There has been very little private development of land and water resources for recreational purposes. The Bureau of Outdoor Recreation and others have cited the present and future need for recreational facilities in other regions that cannot be met by public-owned recreational areas, and it can be assumed that this will be true for the Basin.

With the abundance of water and natural beauty that exists in the Basin, there is a potential for private landowners and operators to use this as a source of income. The soil and water resources can be used for multiuse or for income-producing recreation alone. Opportunities are plentiful for a single landowner or for a group of landowners to provide hunting and fishing privileges for a fee. A civic group, town, or other governing body could provide some of these recreational facilities to attract visitors to the area. The farm or ranch can be used to provide family vacations or fishing enterprises successfully. There is a Dude Ranch operating near this vicinity at Quinton, Oklahoma, and near Eufaula, Oklahoma, a man and his wife are operating a summer camp for boys and girls.

Impediments to Economic Growth

There are institutional factors to be overcome before income-producing recreational enterprises can be successful. The inability to secure insurance for liability was quoted as a reason for a fishing enterprise to be abandoned. The beneficial effect of tourist spending on the local economy generally is not recognized.

The age of operators has an effect on the rate new technology will be adopted. The wants and desires of the operators also determine how fast they will accept new methods of production.

The livestock enterprise requires a large investment in land and foundation cow herds. This, along with short-run living expenses, causes a problem in small owners expanding their operation to become more efficient.

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There is a need for more industry to provide off-farm employment to small operators. With additional income many operators could adopt better cultural practices and could more fully utilize their land and water resources. Owners with small holdings could provide facilities for income-producing recreational enterprises.

EASTERN OKLAHOMA A&M COLLEGE PHOTO

Camping in Robbers Cave State Park

IV. PROJECT FORMULATION

The need for a comprehensive approach for planning the entire Poteau River Basin was recognized by local interests in all the communities. Project formulation was based on the programs which would improve and accelerate the growth of the economy and would include the orderly conservation, development, utilization, and management of the soil, water, and other related resources. The objectives of these programs are to provide for the optimum development of the area's natural resources, and when carried out would insure the maximum future productivity and promote a stabilized economy.

The agencies of the USDA have fully coordinated the planning efforts with the Corps of Engineers in the analysis of the interrelationship of the upstream and downstream phases of the studies to assure that the findings and recommendations of the two departments are harmonized. The projects of each department will aid in fully developing and utilizing both human and natural resources, which could not have been achieved by the normal activity of either agency.

The programs agreed upon in the coordinated efforts were predicated on the proper use and treatment of the land and its cover of crops, grass, or trees and to manage the water falling on it as the first increment of Basin development. The water that cannot be controlled by these measures will be further managed by waterflow control structures and other improvement in the headwater tributaries as the second increment. Water that cannot be managed in upstream areas will be controlled by the third increment of downstream reservoirs and related improvements.

This report also will form a basis whereby other Federal, State, and local programs can be integrated to insure optimum development of resources.

BASIS FOR USDA PROJECTS

Land Treatment

USDA project formulation was based on a conservation program being applied to the agricultural and forested lands, consisting of using the land within its capabilities and treating it according to its needs for protection and improvement. This will (1) increase agricultural income through more efficient land use and management; (2) provide land protection against all forms of soil deterioration; (3) improve soil fertility; (4) stabilize critical runoff and sediment-producing areas; (5) improve the productivity of grassland, woodland, and wildlife lands; (6) conserve water for farms, ranches, or recreational uses; (7) provide proper agricultural drainage; and (8) reduce floodwater and sediment damages.

The application of the conservation and land treatment program will (1) provide for the effective utilization of all the land; (2) develop on-farm income-producing recreational enterprises; (3) increase stability of family farms through more efficient operations, by reducing cost, and increased net returns; and (4) improve the economic conditions of low-income farm families and communities.

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Land management and land treatment are interrelated with upstream and downstream structural measures to achieve flood prevention, sediment reduction, and water management objectives. The land treatment measures supplement the structural measures to bring about the improvements needed.

The life of structural measures depends on the application and maintenance of the land treatment measures. The primary function of the upstream structural measures, in addition to storing water for municipal, recreational uses, and fish and wildlife, is to reduce peak flows and provide flood protection in the tributary watersheds. The primary function of the downstream structural measures is to provide flood protection to the Poteau River main stem flood plain, as well as water supply storage for municipal, recreational, fish and wildlife, and quality control.

Upstream Structural Measures

A system of upstream structural measures was planned to furnish flood protection to the flood plain lands of the tributary watersheds commensurate with the land use and land management practices expected during the next 10 to 15 years. Consideration in the investigation also was made for beneficial water supplied for communities, agriculture, recreation, fish and wildlife, and the enhancement of unique areas of natural beauty.

The system of structures being planned by the USDA agencies was fully coordinated with the downstream projects being studied by the Corps of Engineers. The effects of the upstream measures for flood protection on the main stem flood plain were evaluated jointly. Procedures also were developed jointly to allocate the benefits to the main stem flood plain lands that would be attributable to the projects of each department. The combined programs of the two departments most nearly meet all the objectives of resource development in the Basin.

Downstream Structural Measures

The projects proposed by the Corps of Engineers include the following:

1. Modification of the existing Wister Reservoir to provide additional flood control and conservation storage.

2. Channel improvement on the Poteau River below Wister Reservoir.

3. The multipurpose Brazil Reservoir on Brazil Creek.

OTHER PROGRAMS EFFECTING BASIN ECONOMY

The following projects and programs will have an effect on the economy, the resource utilization, and will improve the well-being of the entire population of the Basin.

Ozarka Regional Development Commission

Under the Public Works and Economic Development Act of 1965, the Secretary of Commerce is authorized to designate appropriate "economic development regions" within the United States with the concurrence of the States in which

regions are located. An area in eastern Oklahoma, western Arkansas, and parts of Kansas and Missouri has been designated as such a region and is being described as "Ozarka."

The Ozarka Regional Development Association made up of directors for each county in the region has been organized. The association will make recommendations and furnish assistance to the Ozarka Regional Development Commission, which is being formed at this time. The Commission will make a study and recommend to Congress the projects and programs needed to fully develop the total economy of the region.

Arkansas Multipurpose River Project

This project is being constructed under the direction of the Corps of Engineers and has a completion date of 1970. This comprehensive program will extend barge navigation 450 miles up the Arkansas River, from the Mississippi River to a point near Tulsa, Oklahoma. It also will provide flood control, hydroelectric power, bank stabilization, improved low flows, reduction of sediment in the river, recreational opportunities, and the general advantages of a controlled and developed river basin. The channel will have a minimum depth of 9 feet, with a minimum width of 250 feet on the Arkansas and 150 feet on the Verdigris, and is expected to eventually carry 13 million tons of waterway traffic per year. Three upstream reservoirs in the system are Eufaula Dam, on the Canadian River; Oologah Dam and Reservoir, on the Verdigris River; and Keystone Dam, on the Arkansas River. The completed Dardanelle Dam, upstream from Little Rock, Arkansas, and the Robert S. Kerr Dam in Oklahoma being constructed are also a part of the system.

Eufaula Reservoir

The dam for the Eufaula Reservoir is on the Canadian River 12 miles east of Eufaula, Oklahoma, and forms a lake with a surface of 102,500 acres at the top of the power pool. The reservoir was constructed by the Corps of Engineers for the primary purpose of flood control, hydroelectric power, a key unit in the multipurpose Arkansas Basin plan for navigation, and other allied purposes. A large portion of the lake is within 50 miles of the central part of the Poteau River Basin.

Robert S. Kerr Lock and Dam

This is a Corps of Engineers project under construction and is a part of the Arkansas Basin Plan. The dam for the reservoir is Lock and Dam 15 of the navigation plan and was originally known as Short Mountain Dam. This reservoir, when completed, will be about 40 miles from the central part of the Basin.

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V. PRESENT AND FUTURE NEEDS FOR WATER AND RELATED LAND RESOURCE DEVELOPMENT

PRESENT RESOURCE NEEDS

The present productivity of the agricultural and forested lands of the Basin is far below its potentials. Included in the present resource needs are programs to (1) provide for optimum utilization of the land by accelerating the application of the soil and water conservation practices and the land treatment measures, (2) alleviate floodwater and sediment damages to the Poteau River and tributary flood plain lands, (3) provide for water supply storage for beneficial uses in the upstream areas, and (4) recognize the dependence on private land development as a means of supplying outdoor recreational demands.

A study of the present use, management, and conditions of the land and the trends in developing the water and related land resources provided a basis for projecting future growth, use, and improvements. Technological advances and the rate of acceptance by owners and operators and the application of soil and water conservation practices and increased managerial techniques also were considered.

RESOURCE NEEDS AND DEVELOPMENT - 1980

In projecting the land and water resource needs, numerous sources of information were used. These included national policy guides, economic handbooks, published and unpublished historical data, and projections of Federal, State, and private agencies. Much use was made of the periodic census of agriculture and populations of the Bureau of the Census, U.S. Department of Commerce, and publications of the Statistical Reporting Service, U.S. Department of Agriculture.

Population

The total population in the Basin is expected to increase to about 47,000 by 1980; of these, 32,000 or 68 percent will be urban residents. The rural population is expected to decrease to approximately 15,000 or 32 percent of the total. Approximately 7.5 percent of the total labor force will be engaged in agriculture by 1980.

Land Use

The following tabulation shows the projected land use in the Basin for 1980:

Use	Acres
Cropland	70,620
Pasture and Range	278,250
Forest and Woodland	783,400
Miscellaneous	76,050
Total	1,208,320

Agriculture

Trends - The acreage devoted to growing cultivated crops is expected to continue to decrease. The change in land use is brought about in a large measure by converting to the growing of improved pastures. The projections for the number of livestock indicate a need of about a quarter of a million acres of pasture and rangeland for grazing and hay production by 1980. This acreage will need to include improved varieties of pastures with legumes and a high level of management for both pasture land and the rangeland in order to produce the forage needed to support the livestock in the Basin.

Livestock and Poultry - Projecting the trends in the number of livestock indicate an increase by 6,000 to approximately 49,000 head. Most of the livestock enterprises in this area of Oklahoma are cow-calf. There has been an increase in cattle feeding in Oklahoma and Texas in the past few years. This increased cattle feeding will provide a demand for the feeder calves produced in the Basin. Since 1945 the U.S. per-capita beef consumption has about doubled. This demand for beef is expected to increase 35-45 percent in the next 10 years. The expected increase in beef cattle will require additional pasture forage, feed grains, protein supplements, and hay.

Broiler production is expected to expand to about 6,900,000 per year. The demand for broilers should increase due to the increased U.S. population. The broiler industry will increase the demand for feed grains and protein supplements.

Crop Production - The following table gives the 1980 projected yields with good management for the major crops by soil productivity groupings:

Table 16 - Projected Yields Per Acre for 1980
Poteau River Basin, in Oklahoma and Arkansas

Crops	Unit	Soil Productivity Groups 1/			
		1	2	3	4
Soybeans	bu.	34.8	24.5	-	-
Lint Cotton	lb.	652.6	433.6	-	-
Corn	bu.	65.1	46.5	-	-
Wheat	bu.	51.6	28.7	-	-
Oats	bu.	79.8	33.2	-	-
Alfalfa Hay	ton	4.62	3.50	-	-
Hay (Except Alfalfa)	ton	1.87	1.87	-	2.50
Improved Pasture	a.u.m.	9	5	7	8
Native Pasture	a.u.m.	2.0	1.5	1.5	1.2

1/ Soil Productivity Groups are described on page 32.

Forestry

According to "Timber Trends in the United States," Forest Service, USDA, February 1965 (Forest Resources Report No. 17), domestic demand for timber

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is expected to increase by 30 percent by 1980. Projections for timber resources are dependent on the planned land treatment measures being installed. The sawtimber inventory is estimated to increase by 49 percent by 1980. Total growing stock, including sawtimber, is expected to increase by three-quarters. The timber cut is expected to double. These large relative increases are accounted for in large measure by a present low level of forest industry activity in the Oklahoma portion of the Basin, due to the small size of the pine and low quality of the hardwood.

Most of the cut increase estimated is based on an expected resumption of pulpwood activity, both hardwood and pine. There is a possibility that a pulp mill will be established in the area. It is also expected that pulp mills outside the Basin will resume and increase their roundwood procurement.

Projections are that lumber production will rise from twenty-eight million board feet annually to thirty million by 1980.

Technology and Management

The management practices will continue to improve. As the level of management increases, the adoption of new technology will follow, especially in the use of improved forage crops, to provide pasture for the larger numbers of cattle. With the implementation of technology now available, the projected yields will be realized. Income from agriculture, excluding the sale of timber products, is expected to be above 12 million dollars per year by 1980.

Water Supply Needs

The demand for municipal and industrial water supplies and much of the recreational and fish and wildlife water supplies, needed in the central part of the Basin, can be met from existing or proposed Corps of Engineers reservoirs. The volume of water estimated to meet the projected needs in the upstream areas is in excess of 30,000 acre-feet for municipal, recreation, fish and wildlife, and for livestock and domestic uses. It is expected that farm reservoirs will be developed to supplement ground water supplies for livestock and domestic uses.

Recreational Demand

One of the growing demands on land and water resources is created by the vast interest in outdoor recreation. This is due to the expanding population, higher per capita income, and the great advance in technology which has increased enormously the leisure time of all levels of American working class society. The Outdoor Recreation Resource Review Commission (ORRRC), established by Congress in June 1958 to make an intensive nationwide study of outdoor recreation, has predicted a great expansion in the future demand for outdoor recreation. Their estimates are that participation in outdoor recreation will triple by the year 2000.

Outdoor recreation is important to the people of this region as a source of health and well-being and as an economic factor. Tourism is becoming one

of the major sources of income to residents in the Basin. The fall of the year brings thousands of people into the area to see the beautiful foliage in the forested regions. Early spring also has tours showing the redbud, wild plum, and the beautiful dogwood. During the winter months the pine adds beauty to the rolling mountainous terrain of the southern area of the Basin.

The demand for outdoor recreation in eastern Oklahoma and western Arkansas is growing, and the increasing need for the development of additional recreational opportunities was recognized during the Basin investigation. The demand for water-oriented outdoor recreational activities within the next 10 to 15 years will begin to exceed the facilities provided in the State parks, the Ouachita National Forest, and the Corps of Engineers reservoirs. It can be assumed there will be an increasing need for these opportunities to be developed on private land to satisfy this demand.

Recreational demands are defined as the need of the people for water-oriented recreational opportunities. "Recreation Day" is a factor used to express the number of times each person will visit these recreational areas each year.

For this area the present recreation day factor is about 6. This means, on the average, the population will attend a water-oriented recreational area about 6 times a year. During the next 50 years this factor is expected to increase to about 12.

The recreational day demands estimated by the Corps of Engineers are expected to be about 1,600,000 in 1980 and to increase to 5,100,000 by 2020.

RESOURCE NEEDS AND DEVELOPMENT - 2020

The urban population is extrapolated to 2020 and is expected to increase at a more rapid rate between 1980 and 2020 than between 1965 and 1980. The rural population rate of decrease should level off and will not be as rapid as in the past or that projected between 1965 and 1980.

The total projected population should be somewhere near 88,000 in the year 2020. The rural population will comprise 10.2 percent of the total or approximately 9,000 persons. The remaining 89.8 percent or 79,000 will live in urban areas. Approximately 98 percent of the projected labor force will be engaged in occupations other than actual farming operations by 2020.

Livestock is expected to remain the major enterprise in the agricultural economy of the Basin. Poultry production is expected to continue to be second in importance in income for the Basin in the year 2020. The number of cattle should reach somewhere near 59,000 head by the year 2020, and broiler numbers will approach 9,000,000.

The acreage of cultivated crops is expected to increase by the year 2020. This change in total acreage devoted to crop production may cause an increase or decrease in the percentage of a specific crop grown.

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Technological advances and accelerated land treatment measures are expected to increase production of forage and other crops which will be utilized in the immediate area by the cattle and broiler enterprises. The increased urban population will increase the demand for any specialty crops that may be grown.

Figure 5 shows the projected land use for the year 2020.

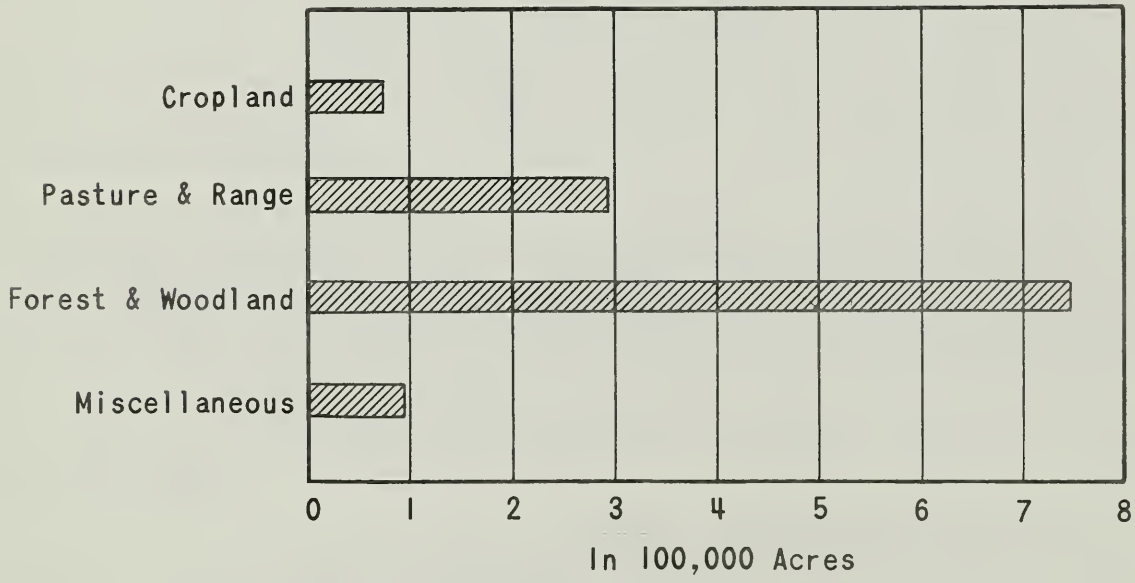

Figure 5 - Projected Land Use - 2020
Poteau River Basin, in Oklahoma and Arkansas

The demand for timber is expected to increase by 120 percent by the year 2020. There will be a continuing need for more forage production to attain the shift of cattle out of private forest lands.

The timber resource projections for 2020 are on the same premise as those for 1980. The sawtimber inventory is estimated to increase by 135 percent and growing stock, including sawtimber, two and three-fourths times. Lumber production is expected to increase to more than thirty-five million board feet.

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VI. WORKS OF IMPROVEMENT

PART 1. USDA RESOURCE DEVELOPMENT PROGRAMS

Studies and evaluations have been made of the available data for opportunities in which U.S. Department of Agriculture programs or authorities can contribute toward a solution of the water and related land resource problems of the Basin. These projects were coordinated with those being studied by the U.S. Army Corps of Engineers.

ASSISTANCE PROGRAMS

Public Law 566

The Watershed Protection and Flood Prevention Act, Public Law 566, as amended, authorizes the Secretary of Agriculture to cooperate with local organizations in planning and carrying out works of improvements for flood prevention and/or for the conservation, development, utilization, and disposal of water in watershed or subwatershed areas smaller than 250,000 acres. The Act provides for technical, financial, and credit assistance by the U.S. Department of Agriculture to landowners, operators, and other people living in small watersheds. Project-type action under the Act is intended to supplement other soil and water conservation programs and other programs for the development and flood protection of major river valleys.

Public Law 46

The soil and water conservation program authorized by Public Law 46, cooperates with local groups, such as soil and water conservation districts, as well as with other Federal agencies in the development and implementation of soil and water conservation programs.

The Soil Conservation Service provides technical assistance to soil and water conservation districts. These programs assist the farmers and ranchers in the planning and application of measures needed for the protection, utilization, and improvement of the cropland, pastures, and woodland. A portion of this program is devoted to the procurement of essential data through soil surveys and to interpret these data for nonagricultural as well as agricultural purposes. Soil and water conservation districts serving the entire Basin area are as follows:

Soil and Water Conservation District	Location
LeFlore County	Poteau, Oklahoma
Latimer County	Wilburton, Oklahoma
Haskell County	Stigler, Oklahoma
Sebastian County	Fort Smith, Arkansas
Poteau River	Waldron, Arkansas
Rich Mountain	Mena, Arkansas

Forest Service

The Forest Service administers the 213,145 acres of Ouachita National Forest land in the Basin through a supervisor's office in Hot Springs, Arkansas.

Lands in the Basin within the Ouachita National Forest include most of two Ranger districts: the Poteau District and the Choctaw District, and also portions of three other districts. Districts and headquarters are:

Ranger Districts	Location
Choctaw	Heavener, Oklahoma
Poteau	Waldron, Arkansas
Mena	Mena, Arkansas
Cold Springs	Booneville, Arkansas
Kiamichi	Talihina, Oklahoma

Other Agencies

The Agricultural Stabilization and Conservation Service administering the Agricultural Conservation Program (ACP) was authorized by the Soil Conservation and Domestic Allotment Act of 1936 and amended in 1937 to furnish cost-share assistance to farmers and ranchers in carrying out needed soil, water, woodland, and wildlife conservation practices on their land.

The Farmers Home Administration of the U.S. Department of Agriculture makes water development and soil conservation loans to eligible individual farmers and groups of farmers and rural residents to develop water supply systems for rural, domestic, and livestock use; to drain farmland and to carry out soil conservation practices. Each loan is scheduled for repayment, in accordance with the borrower's ability to repay, over a period not exceeding 40 years. In addition to loans to individuals and groups, loans are also available to local organizations to help finance projects and develop land and water resources in small watersheds planned under authority of Public Law 566. Eligible local organizations include soil and water conservation districts, watershed conservancy districts, and similar organizations which have authority under State law to carry out, maintain, and operate works of improvement. These watershed loans are repayable over periods up to 50 years.

The land operations office of the Bureau of Indian Affairs is assisting the owners and operators of Indian land in the application of the needed soil and water conservation practices. Assistance is being furnished on 530 acres in Haskell County, 1,270 acres in Latimer County, and 5,125 acres in LeFlore County. Total land being managed by the BIA amounts to 6,925 acres.

The Arkansas Forestry Commission and the Oklahoma Division of Forestry in cooperation with the U.S. Forest Service, provide fire protection, management assistance, and forest planting stock for private forest landowners.

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Oklahoma State University Agricultural Experiment Station is providing research and educational information and recommendations to farmers and ranchers on land use and management practices.

The Oklahoma Department of Wildlife Conservation and the Arkansas Game and Fish Commission provide technical and other assistance in planning and promoting the application of fish and wildlife habitat development.

The Extension Service assists with the educational phase of the program by conducting general information and local farm meetings, preparing radio, television, and press releases, and using other methods of getting information to landowners and operators in the Basin.

LAND TREATMENT

The objectives of the land treatment program are to provide for optimum utilization in order to satisfy current needs and at the same time to conserve the land, water, and related resources for the use of future generations. From the available data it is estimated that only about 30 percent of the land treatment practices needed to furnish flood prevention and watershed protection to the Basin has been installed. The establishment and maintenance of all soil and water conservation measures essential to proper land use and treatment are needed in reaching this objective. All available U.S. Department of Agriculture programs will be used to assist in establishing the needed conservation practices on the agricultural and forested as well as nonagricultural lands in the Basin. These measures are especially important for protection of the upland areas to support and supplement structural measures. Owners and operators will be encouraged to install practices which will have a measurable effect on the reduction of floodwater and sediment damages. Also included will be those practices which will reduce the cost of providing sediment storage capacity in structural measures.

In these programs the landowners and operators will be encouraged to use the land within its capabilities and to carry out treatment according to its needs. The acreage of land treatment which has been applied in recent years by landowners and operators and the estimated cost of installing these measures for each watershed are shown in Appendix table A4, page 120. A summary of the extent to which the land treatment measures have been applied and the expenditures made are shown in the following tabulation:

Land Use	Land Treatment (Acres)	Estimated Cost (Dollars)
Cropland	20,000	610,000
Pasture and Rangeland	125,000	4,160,000
Forest and Woodland	36,000	324,000
Wildlife Areas and Recreation 1/	16,000	320,000
Total	197,000	5,414,000

1/ Land in private ownership

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The acreage of land treatment needed in each watershed and the estimated cost of installing these practices in the next 10 to 15 years are shown in Appendix table A5, page 120. A summary of the estimated expenditures and the acreage to be treated by the year 1980 are shown for each land use in the following tabulation:

Land Use	Land Treatment (Acres)	Estimated Cost (Dollars)
Cropland	49,000	1,255,000
Pasture and Rangeland	155,000	5,910,000
Forest and Woodland	113,000	1,361,000
Wildlife and Recreation 1/	47,000	2,930,000
Total	364,000	11,456,000

1/ Land in private ownership.

Cropland

The land treatment measures to be applied to cropland include the use of conservation cropping systems consisting of cover and green manure crops, improved tillage to attain crop residue utilization for soil protection and conditioning, and the growing of grasses and legumes in rotation. These measures will improve soil cover conditions, which will increase the infiltration rate and water-holding capacity, and assist in maintaining higher levels of agricultural productivity. The construction of terraces, the development of waterways, and the application of contour farming practices will provide for better water control, and also will decrease erosion damage and sediment yields from cultivated fields. These measures will reduce damages from floodwater, sediment, and flood plain scour and will enhance the use of the cropland. The installation of drainage features on bottomland soils with wet conditions also will increase crop production.

Pasture and Rangeland

Land treatment measures to be applied on pastures and rangeland include establishing or reestablishing adapted species of pasture and range grasses and a high degree of management. These management practices may include proper use, brush and weed control, liming, fertilization along with fencing for control grazing, and developing adequate water supplies. These measures will improve soil and cover conditions, increase carrying capacities, decrease soil deterioration and erosion losses, increase net returns from livestock farming, and improve the economic conditions. These practices also will reduce the damage to flood plain lands from floodwater, sediment, and erosion.

Forest and Woodland

Land treatment measures to be applied to forests and woodlands include: (1) establishing timber stands either by reforestation of appropriate open land or reinforcement of understocked stands by interplanting or underplanting, (2) timber stand improvement, by release of desirable species, removal of undesirable species and cull trees, thinnings, stand conversion, and

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SOIL CONSERVATION SERVICE PHOTO

Rangeland in the Basin

SOIL CONSERVATION SERVICE PHOTO

Cattle need good pasture to make the best production

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ARKANSAS FORESTRY COMMISSION PHOTO

A forest fire detection tower

OKLAHOMA DIVISION OF FORESTRY PHOTO

Deadening undesirable species
to release pine seedlings

salvage and harvest cuttings, (3) control of grazing, by fencing of woodlands to keep out domestic livestock, and (4) erosion control, by establishing a protective cover on areas where there is active gully or sheet erosion. These practices reduce runoff and erosion by increasing the infiltration and water-holding capacity of the soil and restore the forest to a healthy, productive state. In addition to the above practices, the following are used on National Forest lands to improve problems acquired with the lands: (1) old road and skidtrail stabilization, by revegetating with trees and/or grasses and installing water bars or small diversion ditches, (2) stream channel clearing, by removing old logging debris or dead and fallen trees choking stream channels, permitting a more orderly streamflow and reducing chances for flooding during storm periods, and (3) roadbank stabilization, by shaping and stabilizing cut and fill slopes, which reduces erosion and sediment production, reduces road maintenance costs, and improves aesthetics.

U. S. FOREST SERVICE PHOTOS

Roadside erosion controlled with lespedeza.

Old logging road stabilized with lovegrass.

Other Land Treatment Considerations

Fire Prevention - Seasonal burning occurs in parts of the Basin. This has been a major problem in the past as it was an old practice to burn pastures, rangeland, and pastured woodland to obtain a quick growth of high protein grasses in the early spring.

Under the leadership of the Extension Service and assisted by the State Forestry organizations and local soil conservation districts, educational

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programs are being carried on by the schools and others to show the detrimental effects of burning. These programs have been effective in reducing the amount of burning.

The State of Oklahoma's Division of Forestry estimated that reaching the level of fire protection necessary for good watershed management in the Oklahoma portion of the Basin will require annual expenditures nearly three times the present. Two additional fire towers are considered necessary in the Oklahoma part of the Basin.

The U.S. Forest Service maintains an active fire protection system for the Ouachita National Forest lands in the Basin.

Drainage - Approximately one-fourth of the bottomland soils have a major problem of excessive wetness. These figures were based on estimates made from a study of soil maps prepared from a soil survey of the area. Suitable drainage systems have been installed on about 20 percent of the land which needs drainage. Some of the wet soils have been drained to the degree suitable for crops which do not need complete drainage; however, most of the soils need to be drained for best production under present use. Drainage practices are not being planned on land more suitable for wildlife than for the production of crops or pastures.

SOIL CONSERVATION SERVICE PHOTO

Field drainage improves crop production

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Most of the land that will need drainage will have suitable outlets for field ditches. Diversion terraces placed to intercept runoff from side hills and convey the water to natural outlets through surface field ditches will alleviate many problems areas. There will be, however, land which will need drainage that will need group laterals to provide outlets. These will not be extensive, with only 3 to 5 landowners involved, and can be planned under Public Law 46 programs.

Recreation and Wildlife

Fish and Wildlife - The stocking of farm ponds that are suitable for fish production and the stocking of fishponds and pools caused by strip mines, with proper management, not only will furnish recreational opportunities but can provide farmers with additional income. Management practices may include developing or improving the fishing habitat by fertilizing, liming, using fish toxicants, feeding, controlling diseases and parasites, excluding livestock, or by other means.

Effective wildlife habitat improvement can be made on private farms and forest land without much additional outlay in labor and materials. Many of the regular soil and water conservation practices such as stripcropping, plantings for gully erosion control, windbreaks, and farm ponds also are wildlife habitat improvements. Protecting woodlots and odd areas from grazing and fire requires little expenditure of funds and provides excellent habitat for bobwhite, dove, rabbit, squirrel, deer, and similar wildlife.

SOIL CONSERVATION SERVICE PHOTO

Wildlife habitat

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SOIL CONSERVATION SERVICE PHOTO

Outdoor recreation in the Basin

PHOTO COURTESY CHAMBER OF COMMERCE, POTEAU, OKLAHOMA

Horseback riding provides recreation; Cavanal Mountain is in the background

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Improvement in wildlife habitat can be made by letting vines and shrubs grow along fences and in odd corners, by resisting the urge to plow to the edge of every field, by planting strips of annual lespedeza, sericea lespedeza, grass-legume mixtures around the edge of cultivated fields, and by leaving a few rows of corn or other grain standing along field borders at harvest time. Wildlife habitat development may include establishing perennial, biennial, or annual plants for wildlife food or cover. Wildlife habitat preservation may include retaining existing wildlife habitat by limiting agronomic, forestry, or other husbandry uses and applying necessary maintenance measures.

Recreation - Includes the land treatment and management needed for recreational purposes. Opportunities for income-producing recreational enterprises on farms and ranches are being recognized. There are farms and ranches in the Basin that now show very small economic returns which could be converted to profitable recreational enterprises. Outdoor recreation, with all its ramifications, offers opportunities for farm families whose incomes are currently marginal to stay on their farms and increase their standard of living, by supplementing their income with recreational enterprises.

Strip Mined Areas - It is estimated that about 6,200 acres have been strip mined for coal in the Basin. Through the strip mining process, huge deposits of spoil not only mar the landscape but serve as a source of undesirable soil material that is subject to erosion. These deposits of substrata materials generally are unproductive, and, if permitted to remain barren of vegetative cover, the outwash from this area will mask the productivity of adjacent fertile fields.

SOIL CONSERVATION SERVICE PHOTO

Black locust grows on strip mines

In the application of conservation land treatment, the need for the vegetation of strip mined areas has been recognized. It was found that these areas would support a cover of trees or grass but have many problems in establishment and management. Black locust trees and mixtures of grasses and legumes were the most successful vegetation used for this purpose since they are legumes, and nitrogen is always lacking in spoil areas.

The strip mined areas would provide land for outdoor recreational opportunities and when established in a vegetative cover using selected species the following would be accomplished:

1. Furnish vegetative cover for strip mined areas.

2. Prevent outwash from spoil areas to cover productive land.

3. Provide habitat for fish and wildlife.

4. Provide opportunities for outdoor recreational activities.

5. Add beautification to the landscape and the natural beauty of the countryside.

WATER RESOURCE DEVELOPMENT

USDA programs are included under authorized Public Law 566 projects, proposed projects, and those needed to develop the full resource potential of the Basin. The Projects Map, plate 7, following this page, shows these projects.

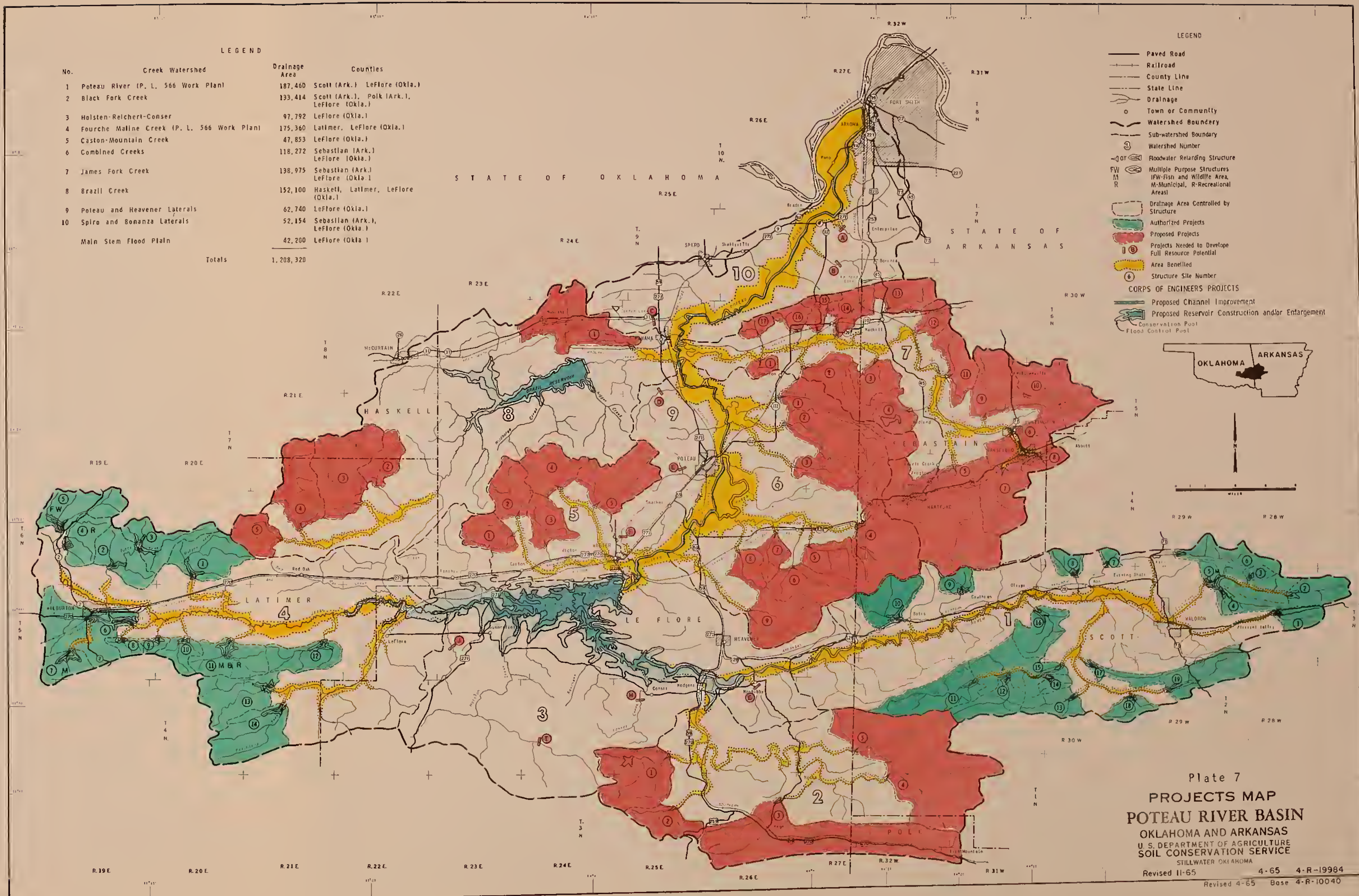
Authorized Public Law 566 Projects

A watershed work plan was developed on the Fourche Maline Creek watershed in May 1960, on the Poteau River watershed in March 1963, and on the Caston-Mountain Creek watershed in July 1965. The Fourche Maline and Poteau River watersheds are authorized for construction, and on each watershed some of the structures included in the plans have been installed.

Poteau River Watershed - The local sponsoring organizations for this work plan are the Poteau River Soil and Water Conservation District, the LeFlore County Soil and Water Conservation District, and the city of Waldron, Arkansas. It is estimated that the improvements proposed in the work plan can be accomplished in a 5-year period.

The watershed contains 187,460 acres located in Scott County, Arkansas, and LeFlore County, Oklahoma. This area is shown on the Projects Map, plate 7. The land use in the watershed is estimated at 26,620 acres in cropland, 33,910 acres in pasture, 123,460 acres in woodland, and 3,470 acres in miscellaneous use. There are 82,000 acres in the Ouachita National Forest being administered by the U.S. Forest Service.

The installation of the land treatment measures planned for this area during the 5-year period is estimated to cost $796,450.


LEGEND
No. Creek Watershed Drainage Area Counties
1 Poteau River (P. L. 566 Work Plan) 187,460 Scott (Ark.) LeFlore (Okla.)
2 Black Fork Creek 133,414 Scott (Ark.), Polk (Ark.), LeFlore (Okla.)
3 Holsten-Reichert-Conser 97,792 LeFlore (Okla.)
4 Fourche Maline Creek (P. L. 566 Work Plan) 175,360 Latimer, LeFlore (Okla.)
5 Caston-Mountain Creek 47,853 LeFlore (Okla.)
6 Combined Creeks 118,272 Sebastian (Ark.) LeFlore (Okla.)
7 James Fork Creek 138,975 Sebastian (Ark.) LeFlore (Okla.)
8 Brazil Creek 152,100 Haskell, Latimer, LeFlore (Okla.)
9 Poteau and Heavener Laterals 62,740 LeFlore (Okla.)
10 Spiro and Bonanza Laterals 52,154 Sebastian (Ark.), LeFlore (Okla.)
Main Stem Flood Plain 42,200 LeFlore (Okla.)
Totals 1,208,320
LEGEND
Paved Road
Railroad
County Line
State Line
Drainage
Town or Community
Watershed Boundary
Sub-watershed Boundary
Watershed Number
Floodwater Retarding Structure
Multiple Purpose Structures (FW-Fish and Wildlife Area, M-Municipal, R-Recreational Areas)
Drainage Area Controlled by Structure
Authorized Projects
Proposed Projects
Projects Needed to Develope Full Resource Potential
Area Benefited
Structure Site Number
CORPS OF ENGINEERS PROJECTS
Proposed Channel Improvement
Proposed Reservoir Construction and/or Enlargement
Conservation Pool
Flood Control Pool
OKLAHOMA
ARKANSAS
STATE OF OKLAHOMA
STATE OF ARKANSAS
HASKELL
LATIMER
LE FLORE
SCOTT
POLK
FORT SMITH
POTEAU
HEAVENER
WALDRON
SPIRO
BRAZIL RESERVOIR
Plate 7
PROJECTS MAP
POTEAU RIVER BASIN
OKLAHOMA AND ARKANSAS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER OKLAHOMA
Revised 11-65
4-65 4-R-19984
Revised 4-65 Base 4-R-10040

The structural measures included in the work plan consist of 18 floodwater retarding structures, one multipurpose structure, and 10.1 miles of stream channel improvement. The estimated cost of these measures amounts to $4,584,980.

The average annual cost of structural measures is estimated to be $145,515. These measures are expected to produce average annual project benefits of $329,486, or $2.30 for each dollar of cost.

Fourche Maline - The local sponsoring organizations for this work plan are the Fourche Maline Conservancy District, the Latimer County Soil and Water Conservation District, the LeFlore County Soil and Water Conservation District, the city of Wilburton, and the Wilburton Public Works Authority. It is estimated that improvements proposed in the work plan can be accomplished in a 10-year period.

The watershed contains 175,360 acres in Latimer and LeFlore counties, Oklahoma. The land use in the watershed is estimated at 11,310 acres in cropland, 24,950 acres in pasture, 134,800 acres of woodland, and 4,300 acres in miscellaneous use.

The installation of the land treatment measures planned for this area during the 10-year period is estimated to cost $817,190.

The structural measures included in the work plan consist of 10 floodwater retarding structures and 4 multipurpose structures. The estimated cost of these measures amounts to $5,230,893.

The average annual cost of the structural measures is estimated to be $181,169. These measures are expected to produce average annual project benefits of $243,233, or $1.30 for each dollar of cost.

Caston-Mountain Creek Watershed - The local sponsoring organizations for this work plan are the Caston-Mountain Creek Conservancy District No. 2, the LeFlore County Soil and Water Conservation District, and the town of Wister, Oklahoma.

Caston Creek rises nine miles northwest of Wister, Oklahoma, and flows south and easterly, being joined by Mountain Creek in the southwest edge of town, and continues easterly two miles into the Poteau River. Mountain Creek has its origin on Cavanal Hill, seven miles north of Wister, and flows through the west section of town into Caston Creek.

The watershed covers an area of 47,853 acres in LeFlore County, Oklahoma. The flood plain area amounts to 2,668 acres. The land use is estimated at 3,000 acres in cropland, 6,200 acres in pasture and rangeland, 37,488 acres in forest and woodland, and 1,165 acres in miscellaneous uses, such as urban area, roads, lakes, and stream channels. All works of improvement included in the plan are on privately owned land.

Land treatment measures will be established by landowners and operators on 1,050 acres of cultivated land, 8,000 acres of grassland, 14,500 acres of woodland, and 564 acres of miscellaneous land at a cost of $321,700.

Land treatment provided in recent years by local interest has cost an estimated $187,125.

The structural measures included in the plan consist of four floodwater retarding structures, one multipurpose structure, water supply line, and dike. The water supply will be developed for the town of Wister, Oklahoma. The cost of these measures is estimated to be $2,221,090. The structures will control 29,645 acres, or 62 percent of the drainage area of the watershed.

The average annual cost of structural measures is $76,173. Total benefits amounting to $115,842 from structural measures will provide a benefit-cost ratio of 1.5:1.

Proposed Projects

Individual watersheds with projects needed during the next 10 to 15 years, which would be feasible under Public Law 566 criteria: (1) Black Fork Creek, (2) Combined Creeks, (3) James Fork Creek, and (4) Brazil Creek were studied to the degree and intensity to assure that projects are feasible for development. These watersheds have the following additional characteristics:

1. Significant contributions to the development of economically depressed rural areas.

2. Foreseeable needs and capable sponsorship of water supplies for municipal and industrial uses, fish and wildlife, and recreation storage.

3. Parts of a comprehensive system including downstream project elements which are needed for water resource development of the Basin.

In making the determination on the feasibility for projects on each watershed, only the cost associated with flood prevention and flood prevention benefits was used in making the evaluation to determine if the benefits would exceed the cost of the structures. Multipurpose watershed projects are needed for other purposes in many of the watersheds. These purposes were added to the watershed projects after feasibility was determined on the basis of flood prevention benefits and cost.

The first consideration in the selection and location of structure sites was for the protection of the flood plain lands and the protection of agricultural and urban property. The level of protection needed which cannot be met by land treatment influences the location of sites. Other considerations were the needs for multipurpose storage for beneficial uses and to augment the flow of some of the streams in the Basin. The final determination for the number and location of the sites was made from an economic analysis of the cost and benefits.

In a number of the watersheds it was found that neither the ground water sources nor the present surface sources are sufficient to meet the future

water needs for the towns and communities in the upstream areas. The development of surface water resources was considered to be the most practical and economical means of meeting these requirements. The need of structures for flood protection and the requirements for municipal water supply storage can be met, in many instances, by multipurpose structures. There are also needs for developments which will afford water supplies for fish and wildlife, recreation, and other beneficial uses as project purposes. Detailed tributary reports on these watersheds are included in the Appendix.

Black Fork Creek Watershed - The watershed covers an area of 133,414 acres in LeFlore County, Oklahoma, and Scott and Polk counties, Arkansas. The land use is estimated at 5,570 in cropland, 11,020 in pasture and rangeland, 114,124 acres in forest and woodland, and 2,700 acres in miscellaneous use. Included in the watershed area are 74,377 acres in the Ouachita National Forest and 16,000 acres in the Wister Reservoir area. Flood plain lands amount to 5,872 acres.

Land treatment measures have been established in recent years by owners and operators in the watershed at an estimated cost of $340,300. Land treatment needs during the next 10 to 15 years include treatment on 2,660 acres of cropland, 10,100 acres of pasture and rangeland, 9,000 acres of forest and woodland, and 5,950 acres for wildlife and recreational areas. The estimated cost for the application of these measures is $975,600.

Structural needs include two floodwater retarding structures, three multipurpose structures, and recreational development along 22.5 miles of stream channels. The structures will control 70,298 acres or 53 percent of the watershed area. The multipurpose structures will provide 13,652 acre-feet of capacity for fish and wildlife storage for release to augment stream flows in Black Fork, Haws, and Big creeks.

The estimated cost of the structures is $2,446,700. The annual cost including operation and maintenance is $108,354. Total benefits amounting to $130,383 from structural measures would provide a benefit-cost ratio of 1.2:1.

Combined Creeks Watershed - The watershed covers an area of 118,272 acres in LeFlore County, Oklahoma, and Sebastian County, Arkansas. The land use is estimated at 10,100 acres in cropland, 18,515 acres in pasture and rangeland, 86,517 in forest and woodland, and 3,140 acres in miscellaneous uses. Included in the watershed area are 3,380 acres in the Ouachita National Forest. Flood plain lands amount to 3,205 acres.

Land treatment has been established in recent years by owners and operators in the watershed at an estimated cost of $412,600. Land treatment needed in the next 10 to 15 years includes treatment on 4,635 acres of cropland, 20,300 acres of pasture and rangeland, 18,000 acres of forest and woodland, and 3,000 acres for wildlife and recreational areas. The estimated cost for the application of these measures is $1,302,100.

The upstream structural measures needed in this watershed consist of six floodwater and three multipurpose structures. The structures will control 62,349 acres, which is 53 percent of the watershed area. The multipurpose

structures will provide 1,002 acre-feet of storage for recreation and 1,000 acre-feet for municipal water supply.

The estimated cost of the structures is $2,688,600. The annual cost including operation and maintenance is $105,678. Total benefits amounting to $132,956 from structural measures would provide a benefit-cost ratio of 1.3:1.

James Fork Creek Watershed - The watershed covers an area of 138,975 acres in Sebastian County, Arkansas, and LeFlore County, Oklahoma. The present land use is 19,700 acres in cropland, 23,625 acres in pasture and rangeland, 88,775 acres in forest and woodland, and 6,875 acres in miscellaneous uses. Flood plain lands amount to 7,308 acres. Included in the watershed area are 6,618 acres in the Ouachita National Forest.

Land treatment measures have been established in recent years by owners and operators in the watershed at an estimated cost of $841,100. Land treatment needed in the next 10 to 15 years includes treatment on 4,230 acres of cropland, 16,800 acres of pasture and rangeland, 10,000 acres of forest and woodland, and 7,700 acres of wildlife and recreational areas. The estimated cost for the application of these measures is $1,356,500.

The upstream structural measures needed consist of five floodwater and 12 multipurpose structures. The structures will control 92,755 acres, which is 67 percent of the watershed area. The multipurpose structures will provide 2,905 acre-feet of storage for recreation and 7,015 acre-feet for municipal water supply.

The estimated cost of the structures amounts to $3,041,300. The annual cost including operation and maintenance is $137,333. Total benefits amounting to $201,504 from structural measures would provide a benefit-cost ratio of 1.5:1.

Brazil Creek Watershed - The watershed covers an area of 152,100 acres in LeFlore, Latimer, and Haskell counties, Oklahoma. The present land use is 18,620 acres in cropland, 30,990 acres in pasture and rangeland, 97,490 acres in forest and woodland, and 5,000 acres in miscellaneous uses. Flood plain lands which can be protected by upstream structural measures amount to 3,352 acres.

Land treatment measures have been established in recent years by owners and operators in the watershed at an estimated cost of $804,300. Land treatment needed in the next 10 to 15 years includes treatment on 3,425 acres of cropland, 31,900 acres of pasture and rangeland, 18,000 acres of forest and woodland, and 4,160 acres for wildlife and recreational areas. The estimated cost for the application of these measures is $1,802,200.

The upstream structural measures needed consist of four floodwater retarding structures located upstream from the Corps of Engineers, Brazil Reservoir, and one structure located on Duck Creek tributary drainage below the reservoir. The upstream structures operating with the Corps of Engineers Reservoir will control 85 percent of the watershed area.

The estimated cost of the structures amount to $1,442,300. The annual cost including operation and maintenance is $48,000. Total benefits amounting to $55,645 from structural measures would provide a benefit-cost ratio of 1.2:1.

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Projects Needed to Develop Full Resource Potential

Studies were made to determine the upstream structural needs in all the tributary watersheds. Holston-Reichert-Conser Creeks, Poteau and Heavener Laterals, and Spiro and Bonanza Laterals contain projects which will not justify under existing criteria during the next 10 to 15 years. These watersheds have a high proportion of forest land, a large water yield, and a relatively small acreage to be benefited through water developments and control and do not have good watershed project possibilities under existing conditions and laws. The projects, in a marginal category when evaluated for 1980, might reach feasibility by 2000 or 2020. They contain many small streams which have reservoir sites with good storage possibilities and are suited for development as private or public reservoirs but have minor flood prevention benefits.

Structural sites were investigated at 24 locations, and those with the best possibilities are shown on the Projects Map, following page 84, as lettered sites.

Holston-Reichert-Conser Creeks Watershed - The watershed contains an area of 97,792 acres in LeFlore County, Oklahoma. The tributary streams are Holston, Reichert, and Conser creeks. Flood plain lands along these streams amount to about 1,500 acres. At present the land use in the watershed is 1,930 acres in cropland, 8,630 acres in pasture and rangeland, 78,492 acres in forest and woodland, and 8,740 acres in miscellaneous use. There are 43,258 acres of the watershed located in the Ouachita National Forest. These areas are in the upper reaches and are predominantly uplands. Lands in the lower reaches amounting to 27,135 acres are part of the Wister Reservoir area. About 72 percent of the watershed is in public ownership.

The more urgent need for the owners and operators of the privately owned land is for assistance in establishing land treatment and forest management. These landowners are located between the Ouachita National Forest and the Wister Reservoir area and have opportunity to establish rural recreational enterprises. Structure sites with fish and wildlife or recreational storage would enhance these possibilities.

There were seven sites investigated, and three have good possibilities as multipurpose structures with storage for recreation or fish and wildlife.

Poteau and Heavener Laterals - The watershed covers an area of 62,740 acres in LeFlore and Latimer counties in Oklahoma. It is located in the central part of the Basin and contains all the land not included in other watersheds. The northern part of the watershed is in the vicinity of Poteau, Oklahoma, and includes the area that drains easterly into the Poteau River. It extends on the east side of Wister Reservoir around Heavener, Oklahoma, to include an area south of the east arm of the lake. The portion on the north side of Lake Wister, including the Fanshaw community, contains the remainder of the watershed.

The upland, except the land around Wister Reservoir, generally is steep rougher ground, and is mostly in forest cover. The majority of the privately owned land needs intensive land treatment and management. The

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drainage areas for the streams are small with low percentages of bottomland usually in pastures. The flood plain lands on all the streams are estimated to be about 800 acres. At present the land use in the watershed is 6,180 acres in cropland, 9,990 acres in pasture and rangeland, 38,420 acres in forest and woodland, and 8,150 acres in miscellaneous use. There are 3,612 acres of the watershed in the Ouachita National Forest and 6,450 in the Wister Reservoir area.

There were eight structure sites investigated. Four of these have good recreational storage possibilities.

Spiro and Bonanza Laterals - The watershed is in the lower reaches of the Basin and covers an area of 52,154 acres in Sebastian County, Arkansas, and LeFlore County, Oklahoma. The tributary streams are Coal, Hola Tuska, on the west side of the Poteau River and Wells, Cedar, and Mills creeks on the east side. There are other smaller streams flowing directly into the Poteau River. The flood plain lands on all the streams are estimated to be about 700 acres. At present the land use in the watershed is 8,890 acres in cropland, 15,520 acres in pasture and rangeland, 18,854 acres in forest and woodland, and 8,890 acres in miscellaneous use.

Flood damages in the urban area of Fort Smith, Arkansas, drained by Mills Creek have been quite extensive. Overflows frequently cause damage to low-lying property and disrupt travel. An application has been approved by the Arkansas Soil and Water Conservation Commission to determine the possibility of developing this watershed under authority of Public Law 566. A preliminary investigation has been scheduled to determine feasibility.

There were 9 structure sites investigated. Three of these have good possibilities and potentials as multipurpose structures with storage for municipal and/or recreational uses.

SOIL CONSERVATION SERVICE PHOTO

Floodwater control structure including recreational storage located in Robbers Cave State Park

RECREATION

Recreational needs in the Basin at present are being furnished on 213,245 acres in the Ouachita National Forest, 39,150 acres in the Wister Reservoir area and in three State parks. There are also several thousand acres of private forest lands furnishing hunting and other forms of outdoor recreation.

An inventory of present recreational facilities and the proposed or potential recreational opportunities is shown on the Recreational Map, plate 8, following page 92.

Rural Recreation

More and more Americans each year are seeking outdoor recreational activities. It is part of the national surge to visit the open spaces to find relief from the confinement of urban dwelling. Recreational facilities can no longer accommodate all those desiring their use near the large population centers.

Pressures for recreational opportunities in the Basin can be met to a large extent by facilities on the public lands in the Ouachita National Forest and in the Wister and Brazil Reservoir areas. There will also be recreational facilities added to Public Law 566 projects and to the proposed projects. However, there will be a need in the next 10 to 15 years to supply many of the facilities needed to camp, picnic, swim, hunt, and the like on the private rural land of farms and ranches. There will be opportunities for landowners to develop recreational resources and offer them to the public for a fee. There is also a potential to develop a wide range of different kinds of recreational opportunities including vacation farms, dude ranches, hunting areas, and golf courses. Excellent fishing can be provided with proper fishpond stocking and management, along with ideal camping and picnicking areas.

Privately owned woodland in the Basin offers numerous opportunities to furnish public recreation and at the same time practice forest management. Many of these farm woodlands will be enhanced by the expansion of recreational facilities in the State-owned parks and in the Ouachita National Forest.

State Parks

There are three State parks in the Basin. They are Robbers Cave State Park located near Wilburton, Oklahoma; Wister State Park near Wister Reservoir in the central part of the Basin; and Queen Wilhelmina State Park located on top of Rich Mountain in Arkansas. All are covered in excellent pine forest and have ample room to expand recreational facilities. A description of these parks is in the Appendix, pages 159 and 160.

Ouachita National Forest

The Forest Service has planned an intensive program to develop the recreational potential of the Ouachita National Forest. One of the major

developments is the 55-mile Talimena Scenic Drive, a seven million dollar project, now under construction. The location for this road will be along the crests of Winding Stair and Rich Mountains from Talihina, Oklahoma, to Mena Arkansas. The Drive will attract thousands of visitors annually to view and enjoy the uniquely beautiful Ouachita Mountains in eastern Oklahoma and western Arkansas.

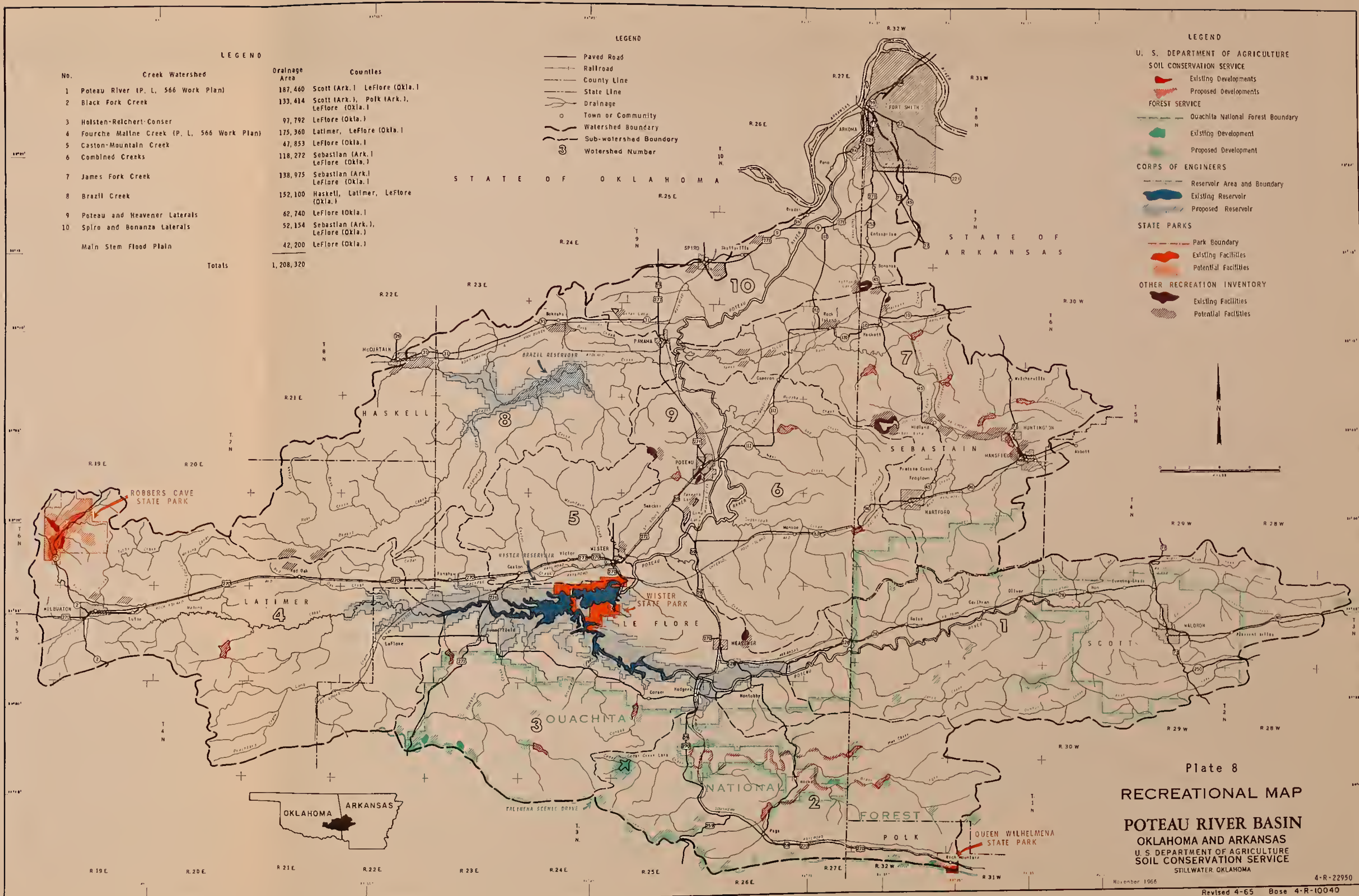
Plans call for constructing 44 recreational sites along this Drive including 9 camping and picnicking areas, 26 vistas, 2 information stations, a visitor information center, 5 historical sites, a natural area, and numerous trails, Appendix, page 161.

There are 13 developed recreational sites in the Ouachita National Forest in the Basin. Ninety-one additional recreational sites are planned for development by the year 2000. Of these, 44 are expected to be developed by 1975. Planning data for these developments are on file at the Forest Supervisor's office in Hot Springs, Arkansas.

The Forest Service through cooperative agreements with the Arkansas Game and Fish Commission and the Oklahoma Department of Wildlife Conservation has established several Game Management areas in the National Forest. The State Wildlife Department regulates the seasons, licenses, and bag limits, and the Forest Service manages the wildlife habitat.

U. S. FOREST SERVICE PHOTO

Talimena Scenic Drive now under construction


LEGEND
No. | Creek Watershed | Drainage Area | Counties
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5 Caston-Mountain Creek 47,853 LeFlore (Okla.)
6 Combined Creeks 118,272 Sebastian (Ark.) LeFlore (Okla.)
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Main Stem Flood Plain 42,200 LeFlore (Okla.)
Totals 1,208,320
LEGEND
Paved Road
Railroad
County Line
State Line
Drainage
Town or Community
Watershed Boundary
Sub-watershed Boundary
3 Watershed Number
LEGEND
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Existing Developments
Proposed Developments
FOREST SERVICE
Ouachita National Forest Boundary
Existing Development
Proposed Development
CORPS OF ENGINEERS
Reservoir Area and Boundary
Existing Reservoir
Proposed Reservoir
STATE PARKS
Park Boundary
Existing Facilities
Potential Facilities
OTHER RECREATION INVENTORY
Existing Facilities
Potential Facilities
STATE OF OKLAHOMA
STATE OF ARKANSAS
HASKELL
LATIMER
LE FLORE
SEBASTIAN
SCOTT
POLK
OUACHITA NATIONAL FOREST
ROBBERS CAVE STATE PARK
WISTER STATE PARK
QUEEN WILHELMENA STATE PARK
BRAZIL RESERVOIR
WISTER RESERVOIR
FORT SMITH
POTEAU
WISTER
SPIRO
HEAVENER
MANSFIELD
HARTFORD
WALDRON
OKLAHOMA
ARKANSAS
Plate 8
RECREATIONAL MAP
POTEAU RIVER BASIN
OKLAHOMA AND ARKANSAS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER OKLAHOMA
November 1966
4-R-22950
Revised 4-65 Base 4-R-10040

PART 2. CORPS OF ENGINEERS SURVEY REPORT

SUMMARY

DEPARTMENT OF THE ARMY
Tulsa District, Corps of Engineers
P. O. Box 61
Tulsa, Oklahoma 74102

June 1966

SUMMARY OF STUDIES OF THE POTEAU RIVER BASIN, OKLAHOMA & ARKANSAS

This is a summary report of the findings of the Tulsa District, Corps of Engineers, of ways and means to further develop and manage the water resources of the Poteau River Basin.

1. AUTHORITY FOR STUDY

The Corps of Engineers investigation of the Poteau River Basin has been made in response to the following:

a. A resolution adopted January 28, 1955 by the Committee on Public Works, United States Senate, which requests an investigation to determine whether further improvements for flood control and allied purposes are advisable in the Poteau River watershed.

b. A resolution adopted August 15, 1961 by the Committee on Public Works, United States House of Representatives, which requests studies to determine if improvements for navigation on the Poteau River to vicinity of Poteau, Oklahoma are advisable at this time.

2. SCOPE OF STUDY & COORDINATION WITH OTHER AGENCIES

The study was made in close association with the Soil Conservation Service, Department of Agriculture, and the plan of improvement was developed in conjunction with Public Law 566 planning for the basin. Flood control, water supply, water quality control, recreation, fish and wildlife, power, irrigation, major drainage, and navigation were all considered in the investigation of the needs of the basin. The U. S. Forest Service and the Economic Research Service contributed to the study through coordination with the Soil Conservation Service. The Federal Water Pollution Control Administration furnished data on needs for municipal and industrial water supply and water quality control. The U. S. Fish and Wildlife Service prepared studies on the fish and wildlife resource. The Bureau of Outdoor Recreation was consulted relative to recreational development. The Federal Power Commission furnished information on power values. The Bureau of Reclamation furnished data on irrigation potentials. The study was coordinated with Oklahoma Water Resources Board, the Oklahoma Department of Wildlife Conservation, and the Oklahoma Industrial

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Development and Parks Commission. The draft report was submitted to interested Federal and State agencies for field-level review on 27 May 1966.

3. EXISTING WATER RESOURCE IMPROVEMENTS

a. Wister Reservoir. Wister Reservoir is the only Corps of Engineers project in the Poteau River Basin. The dam is located on the main stem of the Poteau River at mile 60.9. The project was completed in 1949 at a cost of approximately $10,500,000. The dam is an earth embankment 5,700 feet long. An earth dike spans a valley south of the embankment section. The uncontrolled spillway is located between the embankment and the dike. The reservoir contains 430,000 acre-feet of storage, of which 400,000 acre-feet are for flood control and 30,000 acre-feet for sediment reserve and conservation. The drainage area above the dam is 993 square miles, which is about 52 percent of the Poteau River Basin area.

b. Araknsas River navigation project. The Arkansas River navigation project which is scheduled for completion in 1970 will provide a 9-foot navigable channel along the Arkansas River from its mouth to the Verdigris River and thence along the Verdigris River to vicinity of Tulsa, Oklahoma. Lock & Dam No. 13 of the project, located some 15 miles below Fort Smith, Arkansas, will have a navigation pool which will extend up the Poteau River to the vicinity of Panama, Oklahoma and will create a water depth of 9 feet to about mile 18.

c. Public Law 566 program. Construction is in progress on Public Law 566 improvement in the Fourche Maline and Poteau River watersheds above Wister Reservoir. The plan for these 2 watersheds provides for construction of 33 floodwater-retarding structures with other watershed treatment measures. As presently planned, 5 of the structures will contain storage for domestic water supply, recreation, and fish and wildlife.

d. Other improvements. The Forest Service has a small reservoir on Cedar Creek, a tributary of the Poteau River, above Wister Reservoir. There are other small recreation and water supply lakes in the basin. These impoundments have little effect on runoff.

4. NEED FOR WATER RESOURCE DEVELOPMENT

a. Flood control. There is a definite need for additional flood control improvements in the Poteau River Basin. Flood losses are most severe in the basin below Wister Reservoir, where 895 square miles of drainage area are uncontrolled. Brazil Creek and James Fork, 2 large tributaries in this area, are each capable of producing flooding on the main stem of the Poteau River and measures for control of runoff are badly needed on these streams. The flood problem below Wister Reservoir is further complicated by the restricted channel on the Poteau River, which limits the releases that can be made from the reservoir and thus affects its efficiency for flood control operation. More than 42,200 acres of

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land are subject to flooding along the main stem of the Poteau River below Wister Reservoir alone. Flood losses in this area average about $688,000 annually. In addition, there are large flood losses on Brazil Creek, the James Fork, and other tributaries which enter the main stem below Wister Reservoir.

b. Water supply. Groundwater is scarce in the Poteau River Basin. Surface water is abundant and of good quality. A small amount of storage is reserved in Wister Reservoir for municipal water supply. There are other small water supply impoundments in the basin. The dependable yield of the existing Wister Reservoir, municipal lakes, and SCS projects in the basin is about 13 million gallons per day (mgd). At present there are no large industrial users of water, and the municipal water use is relatively small. Studies by the Federal Water Pollution Control Administration indicate that the water requirement will increase and that there will be a need for about 70 mgd of additional water for municipal and industrial use by the year 2075.

c. Water quality control. Studies indicate that the principal need for water quality control will be along the Poteau River below Wister Reservoir where industrial development is expected because of the proximity of the area to navigation on the Arkansas River. The Federal Water Pollution Control Administration estimates that the need for water for quality control in this area will amount to about 49 mgd by the year 2075.

d. Recreation. The Poteau River Basin is located in an area of scenic mountains and clear streams. Robbers Cave State Park and Wister State Park provide attractive recreation areas. There are other recreation attractions in the basin. However, there is a demand for additional water-oriented recreation. Recreation facilities should be a part of any multiple-purpose reservoir planned for the basin.

e. Fish & wildlife. With population growth and development there will be a need for better management of the fish and wildlife resource of the basin.

f. Power. The cost for installation of hydroelectric power facilities at Corps reservoirs would exceed benefits based on present conditions.

g. Irrigation. Preliminary investigations by the Bureau of Reclamation show that there are about 3,400 acres of arable land near the confluence of the Poteau and Arkansas Rivers which probably could be irrigated with water from either stream. The Bureau states, however, that comparison of these areas with areas for which more detailed studies have been made indicates that potential irrigators would not be able to pay the cost of storage under present economic conditions.

h. Drainage. There are some areas along the Poteau River and its tributaries where the return of floodwater to the main channel is retarded. This creates an on-farm drainage problem but not of the magnitude requiring major drainage facilities.

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i. Navigation. At the present time there is not enough commercial traffic in the basin to make navigation on the Poteau River feasible. However, the basin contains large undeveloped reserves of coal and natural gas which would have a domestic and foreign market if low-cost transportation were established. Development of the coal and gas resource on a large scale is not expected until the Arkansas River navigation is under way. Therefore, the Tulsa District is recommending that detailed studies of navigation on the Poteau River be postponed until such time as navigation on the Arkansas River has progressed far enough to gauge its impact on the economy of the area.

5. PROPOSED PLAN OF IMPROVEMENT

The review of all project purposes indicates there is a present or future need for flood control, water supply, water quality control, recreation, and fish and wildlife conservation. To meet these needs, a plan of improvement is proposed consisting of the following:

a. Modification of the existing Wister Reservoir to provide additional flood control and conservation storage.

b. The multiple-purpose Brazil Reservoir on Brazil Creek.

c. Channel improvement on the Poteau River below Wister Reservoir.

d. A Public Law 566 program as planned by the Soil Conservation Service.

The location of the proposed Corps of Engineers projects is shown on the attached map. Pertinent engineering data are shown in tables 1 and 2.

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TABLE 1 PERTINENT DATA - WISTER & BRAZIL RESERVOIRS

Item	Wister Reservoir		Brazil Reservoir
	Existing	Modified	
Stream	Poteau R	Poteau R	Brazil Cr
River mile	60.9	60.9	8.0
Drainage area, sq.mi.	993	993	199
Project purposes (1)	FC & C	FC, WS, WQC R, & F&WL	FC, WS, R, and F&WL
Elevations, ft, msl:			
Top of dam	527.5	533.5	510.0
Top flood control pool	502.5	507.0	489.0
Top of 50-year flood pool	512.6	505.5	485.0
Top conservation pool	471.6	482.0	468.0
Net storage, acre-feet:			
Flood control	400,000	435,000	108,000
Conservation	17,500	73,000	22,000
Sediment	12,500	30,000	5,000
Total	430,000	538,000	135,000
Reservoir area, acres:			
Top flood control pool	23,000	26,400	7,350
Top conservation pool	4,000	9,700	3,000
Dam:			
Type	Rolled earth	Rolled earth	Rolled earth
Length, ft	5,700	6,850	4,620
Height above streambed, ft	99	105	84
Crown width, ft	25	32	32
Spillway:			
Type	Uncontrolled	Uncontrolled	Uncontrolled
Number & size of gates	-	-	-
Width, ft	600	600	450
Crest elevation, ft, msl	502.5	507.0	489.0
Capacity at max pool, cfs	180,100	150,800	85,800
Outlet works:	2-15.8'x14.0'	2-15.8'x14.0'	1-10'
Low-flow pipe	30"	30"	24"
Water supply pipe	24"	24"	24"
Channel capacity, cfs (2)	6,600	10,000	4,000
Yield, mgd:			
Water supply	6.0	53.0	23.0
Water quality control	-	49.0	-
Total	6.0	102.0	23.0

(1) FC = Flood control; WS = Municipal & industrial water supply; WQC = Water quality control; R = Recreation; C = Conservation; F&WL = Fish & wildlife.

(2) Non-damaging flows below dam sites.

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TABLE 2

PERTINENT DATA
POTEAU RIVER CHANNEL IMPROVEMENT

Existing channel:	
Length, Wister Dam to mouth, miles	60.9
Capacity, cfs	6,000 to 8,000
Record flows, with Wister Reservoir, cfs:	
Wister gage (May 27, 1957)	11,300
Poteau gage (May 30, 1960)	19,500
Panama gage (May 21, 1960)	33,800
Improved channel:	
Length of widening, miles	21.3
Length of cut-offs, miles	7.2
Clearing & snagging, miles	20.9
Bottom width, feet	70 to 165
Side slopes	1 on 2
Average depth, feet	30
Capacity, cfs	10,000 to 15,000
Rights-of-way, acres	2,165
Temporary easements, acres	1,885

6. PROJECT COSTS

Estimated first cost and annual charges for the Corps projects are shown in table 3. Costs are based on average bid prices for similar work in the general area, adjusted to 1966 price levels. The annual charges were determined using an interest rate of 3-1/8 percent and an amortization period of 100 years.

TABLE 3

FIRST COSTS & ANNUAL CHARGES

Item	First Costs	Annual Charges
	$	$
Modification of Wister Reservoir	1,570,000	85,000
Brazil Reservoir	13,000,000	553,400
Channel improvement	9,520,000	430,600
Total	24,090,000	1,069,000

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7. BENEFITS

Flood control benefits attributable to the plan would consist of reduction of flood damages on existing and future development, increased land utilization, rentals from leasing of reservoir lands, and reduction of flooding on the Arkansas River downstream from the Poteau River. Other benefits would include those for municipal and industrial water supply, water quality control, recreation, and fish and wildlife. Average annual benefits credited to the Corps plan are:

Flood control.	$954,800
Municipal & industrial water supply.	299,500
Water quality control.	208,700
Recreation	318,500
Fish & wildlife.	7,000
Total benefits.	$1,788,500.

8. BENEFIT-COST COMPARISON

Comparison of average annual benefits of $1,788,500 to annual charges of $1,069,000 results in a benefit-cost ratio of 1.7.

9. EFFECTS OF THE PLAN OF IMPROVEMENT

The respective plans of the Corps of Engineers and the Soil Conservation Service provide a well-balanced system for main stem and tributary flood control. These plans will meet the 100-year needs of the basin for water supply and water quality control, and will enhance the recreation and fish and wildlife resources of the basin. The plans are flexible and adaptable to expansion if the need for additional improvements occurs in the future.

Attachment:
Watershed Map

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CORPS OF ENGINEERS

U. S. ARMY

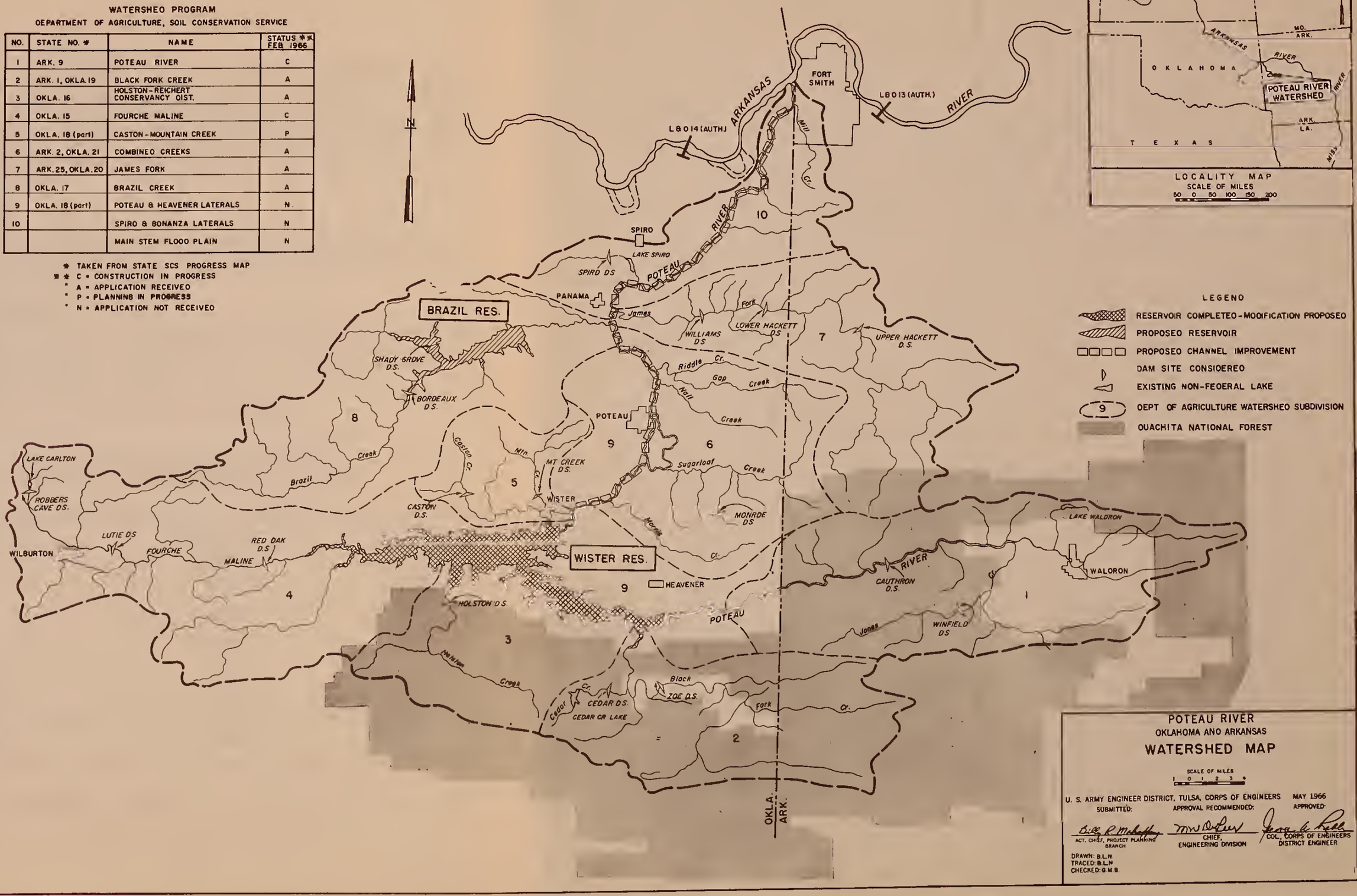
WATERSHED PROGRAM

DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

NO.	STATE NO. *	NAME	STATUS ** FEB. 1966
1	ARK. 9	POTEAU RIVER	C
2	ARK. 1, OKLA. 19	BLACK FORK CREEK	A
3	OKLA. 16	HOLSTON-REICHERT CONSERVANCY DIST.	A
4	OKLA. 15	FOURCHE MALINE	C
5	OKLA. 18 (part)	CASTON-MOUNTAIN CREEK	P
6	ARK. 2, OKLA. 21	COMBINED CREEKS	A
7	ARK. 25, OKLA. 20	JAMES FORK	A
8	OKLA. 17	BRAZIL CREEK	A
9	OKLA. 18 (part)	POTEAU & HEAVENER LATERALS	N
10		SPIRO & BONANZA LATERALS	N
		MAIN STEM FLOOD PLAIN	N

* TAKEN FROM STATE SCS PROGRESS MAP

** C = CONSTRUCTION IN PROGRESS
A = APPLICATION RECEIVED
P = PLANNING IN PROGRESS
N = APPLICATION NOT RECEIVED



LEGEND

- RESERVOIR COMPLETED-MODIFICATION PROPOSED
- PROPOSED RESERVOIR
- PROPOSED CHANNEL IMPROVEMENT
- DAM SITE CONSIDERED
- EXISTING NON-FEDERAL LAKE
- (9) DEPT OF AGRICULTURE WATERSHED SUBDIVISION
- OUACHITA NATIONAL FOREST

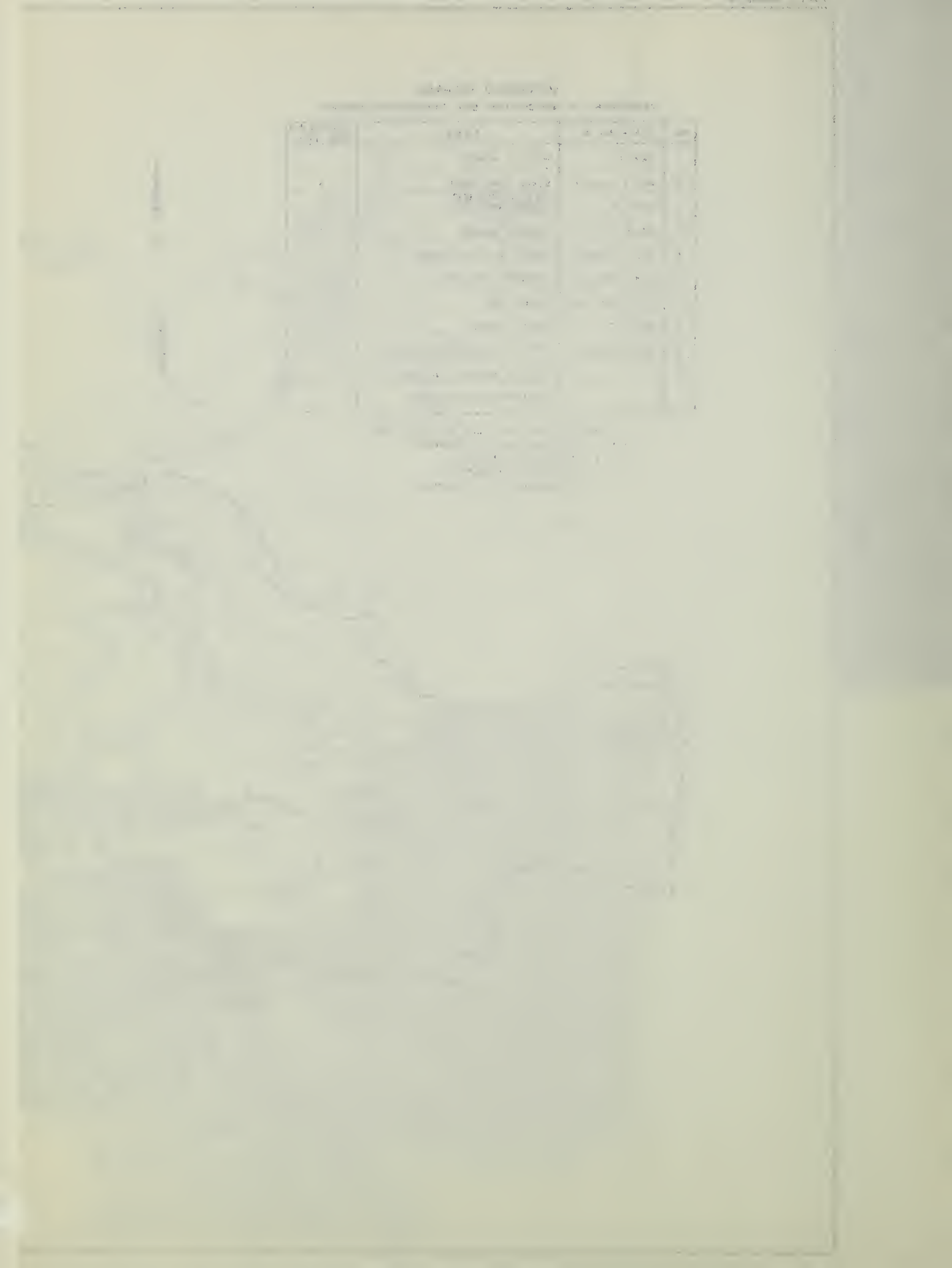
POTEAU RIVER
OKLAHOMA AND ARKANSAS
WATERSHED MAP

SCALE OF MILES
1 0 1 2 3

U. S. ARMY ENGINEER DISTRICT, TULSA, CORPS OF ENGINEERS

SUBMITTED:	APPROVAL RECOMMENDED:	APPROVED:
ACT. CHIEF, PROJECT PLANNING BRANCH	CHIEF, ENGINEERING DIVISION	COL., CORPS OF ENGINEERS DISTRICT ENGINEER
		MAY 1966

DRAWN: B.L.N.
TRACED: B.L.N
CHECKED: G.M.B.



VII. IMPACTS OF PROPOSED PROGRAMS

The USDA programs proposed in this study are part of a comprehensive plan to help satisfy the needs of the Basin. These programs include the installation of land treatment practices and using the land within its capabilities, supplementing the proposed structural measures. The installation of the land treatment needs will require an expenditure of 11.6 million dollars. The structural measures included in authorized Public Law 566 work plans and the proposed projects are estimated to cost about 21 million dollars.

PHYSICAL EFFECTS

The application of the land treatment practices combined with structural measures will reduce erosion, help maintain the productivity of the soil, and reduce damages from flooding and sediment deposition.

Flood Damage Reduction

Under present conditions it is estimated the runoff from a 12-hour, 25-year frequency storm will inundate 22,280 acres of flood plain lands on tributaries of the Poteau River. The installation of the proposed projects would reduce these acres to 10,250.

The following table shows these acres by study area:

Table 17 - Flood Plain Area Inundated 1/
Poteau River Basin, in Oklahoma and Arkansas

Study Area	Without Project	With Project
	(Acres)	(Acres)
Black Fork Creek	5,970	3,540
Brazil Creek	3,350	1,610
Caston-Mountain Creek	2,450	270
Combined Creeks	3,200	750
James Fork Creek	7,310	4,080
Total	22,280	10,250

1/ 12-hour, 25-year frequency storm.

The reduction of acres flooded three feet deep and over by a 25-year frequency storm if the proposed works of improvement were installed is shown in the following table:

Table 18 - Flood Plain Area Inundated Three Feet and Over 1/
Poteau River Basin, in Oklahoma and Arkansas

Study Area	Without Project	With Project
	(Acres)	(Acres)
Black Fork Creek	2,720	960
Brazil Creek	1,240	180
Caston-Mountain Creek	980	20
Combined Creeks	880	40
James Fork Creek	4,740	1,210
Total	10,560	2,410

1/ 12-hour, 25-year frequency storm.

The reduction of the flooding of the bottomland soils will enable owners and operators to use the land more intensively and to improve farm organization and management practices. The application of conservation measures, the developing of improved pastures, and better managed rangeland will increase the carrying capacities of the pastures and rangeland and allow cattle to be moved from the forested areas.

Forest cover and conditions will improve with the livestock grazing curtailed, the fire-control measures intensified, and with proper forest management. These areas will begin to furnish supplemental income and also may provide opportunities for income-producing recreational activities. Privately owned forest lands will be producing more wood products with 80,000 acres less land area by 2020 and at the same time contribute significantly to watershed protection and the reduction of runoff.

Land areas around proposed structures which include provisions for recreational developments will be used intensively by people seeking water-oriented recreational uses. These areas will be 80 percent in woodland cover; however, it will require a high level of management to keep the forest characteristics which enhance these areas for recreational use. It is anticipated that large areas adjacent to these reservoirs will be purchased for residential use.

Projections of land use changes indicate forest lands will be reduced from 827,440 to 747,200 by the year 2020. Part of the change in land use will

come about by the installation of the proposed structural measures. About 10,000 acres of forest land will be used for the proposed USDA projects and 3,800 acres by the Corps of Engineers Brazil Reservoir.

Erosion and Sediment Control

Gross erosion will be reduced through the application of planned land treatment measures as the following table indicates:

Table 19 - Effect of Land Treatment on Annual Gross Erosion
Poteau River Basin, in Oklahoma and Arkansas

Watersheds	Present Gross Erosion	With Proposed Land Treatment
	(Acre-Feet)	(Acre-Feet)
Upper Poteau River	186	169
Fourche Maline Creek	195	178
Caston-Mountain Creek	68	61
James Fork Creek	235	220
Brazil Creek	110	107
Combined Creeks	130	117
Black Fork Creek	107	102

Annual sediment delivered to the mouths of the creek watersheds will be reduced by land treatment and structural measures as the following table points out:

Table 20 - Effect of Sediment Yields in Watersheds
Poteau River Basin, in Oklahoma and Arkansas

Watersheds	Present Yield	Land Treatment	With Land Treatment & Structural Measures
	(Acre-Feet)	(Acre-Feet)	(Acre-Feet)
Upper Poteau River 1/	65	59	38
Fourche Maline Creek 1/	53	48	29
Caston-Mountain Creek	43	39	12
James Fork Creek	113	106	44
Brazil Creek 2/	59	54	26
Combined Creeks	58	53	17
Black Fork Creek 1/	57	55	25

1/ Sediment delivered to Wister Reservoir.

2/ Sediment delivered to proposed Brazil Creek Reservoir.

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Sediment deposition and flood plain erosion (scour) will be substantially reduced on the main stem of the Poteau River and its tributaries by the installation of land treatment and structural measures.

It was recognized in the study and investigation that significant amounts of sediment would be kept out of Corps of Engineers projects; however, these amounts were not evaluated in monetary terms.

Agricultural Water Management

The installation of the floodwater retarding structures on the tributary watersheds, operating with the Corps of Engineers flood control measures, will reduce the hazard of flooding to main stem and tributary flood plain lands. This reduction in damages will provide the incentive for more intensive and more efficient use of the fertile bottomland soils. The elimination of flooding from these areas will make practical the installation of drainage improvements. There are an estimated 26,600 acres of bottomland soils that have a drainage problem. Drainage systems have been installed on 5,750 acres of these soils. Improved drainage on the remainder of these lands will promote an increased fertilization program, the use of better varieties, and the application of more modern farming technology. The protection from flooding and the drainage of the flood plain lands will increase the productivity of these soils at least fourfold.

Nonagricultural Water Management

The installation of the proposed projects will provide municipal water for many of the towns that do not have an adequate water supply. The towns will then be in a better position to attract industry and to take advantage of the opportunities afforded by the completion of the navigation project on the Arkansas River. The completion of this project in 1970 will place the Basin area in a more competitive position with other areas for distant markets because of low cost water transportation.

ECONOMIC EFFECTS

Developing the water and related land resources will enhance the competitive position of the Basin, in relation to other areas, in the production of goods and services resulting directly and indirectly from the proposed projects. The increased returns from farming, ranching, and forest operations will improve the standard of living for the majority of the people. The increased productivity of the agricultural and forested lands will foster an increase in business activity and in the transporting, processing, and marketing industries.

Reduction in Damages

The average annual floodwater damage to the Poteau River and its tributary flood plain lands in feasible projects is estimated to be $822,026. The proposed projects of the USDA would reduce these damages to $451,295, a reduction of 45.1 percent. The damage reduction by study areas is shown in table 21, on the following page.

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Table 21 - Estimated Average Annual Damage for Proposed Projects
Poteau River Basin, in Oklahoma and Arkansas

Study Area	Without Project	With Project
	(dollars)	(dollars)
Brazil Creek above Corps of Engineers Structure	55,776	13,497
Black Fork Creek	62,744	14,484
Combined Creeks	28,605	3,117
James Fork Creek	106,251	19,947
Total Tributary Flood Plains	253,376	51,045
Poteau River Main Stem Flood Plain	568,650	400,250
Total	822,026	451,295

The estimated average annual damage occurring on tributary flood plain lands of the feasible projects is $253,376. These damages would be reduced to $51,045, a reduction of 79.9 percent. In addition, the proposed projects under USDA programs would reduce damages on the Poteau River main stem flood plain an estimated $168,400.

The proposed projects of the Corps of Engineers will further reduce damages on the flood plain lands of Brazil Creek and the Poteau River main stem.

Improvements in Efficiencies

The benefits to agricultural sectors from the proposed projects will be reflected in improved technology. Primarily these will be improved plant breeding, better methods of weed and insect control, application of soil and water conservation practices, improved livestock and poultry, and the improvement of managerial techniques. Benefits for these projects will bring about corresponding changes in forest land management for watershed protection and the optimum productivity of forest lands, both private and public.

Income and Employment

The installation of the land treatment practices and structural measures will result in increased crop production, livestock and livestock products, and forest products. The increased income resulting from greater production

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will provide owners and operators the financial incentive to adopt better management practices and new technology.

The farm labor force is expected to decrease; however, total employment will continue to grow. Construction firms installing works of improvement will hire a large percentage of skilled and unskilled labor from the immediate locality. The operation and maintenance of proposed structures and the associated recreational facilities will provide employment for local residents. Employment will also be provided to furnish services for the people visiting the developments.

Recreational Opportunities and Benefits

The proposed structures with recreation and fish and wildlife storage associated with recreational facilities will provide an estimated 100,000 visitor-days annually. Estimates of storage data and annual visitor-days for the proposed and planning recreational developments are shown in the following table:

Table 22 - Reservoir Data and Visitor-Day Estimates 1/
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Surface	Storage	Shoreline	Annual Visitor-days
	(Acres)	(Acre-Feet)	(Miles)	(Number)
Black Fork Creek	1,086	15,633	16.0	25,000
Fourche Maline Creek	127	2,447	4.3	19,750
Combined Creeks	270	2,280	4.8	17,350
James Fork Creek	593	4,769	20.1	38,200
Total	2,076	25,129	45.2	100,300

Recreational use will be made of the reservoirs constructed for municipal water supply and of the sediment pools of the floodwater retarding structures. Outdoor recreational developments on private land will be supplying an increasing portion of the demands. It was estimated that the USDA programs will provide as much as one-half million visitor-days annually.

Studies by universities have indicated an average daily expenditure between five and six dollars for each recreational visitor into the area. This is a gross expenditure that adds to the Basin economy and would amount to two and one-half million dollars annually, resulting from the recreational opportunities offered by these programs.

Private landowners will be furnishing an ever increasing number of income producing enterprises. Forested lands will be more carefully managed to

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enhance recreational opportunities. Fish and wildlife management will be used as a means of supplying the increasing demands for hunting and fishing.

The recreational facilities planned for the Basin cannot be restricted to use by the population of the area because of the different facets of recreation than can be offered. The Basin is included on the Ozark Trail being publicized by the states of Oklahoma, Missouri, Kansas, and Arkansas. There is a historic site at Old Fort Smith in Fort Smith, Arkansas, at the confluence of the Poteau and Arkansas rivers. Robbers Cave State Park is located near Wilburton and draws about 500,000 visitors a year. The Arkansas Wilhelmina State Park and the Talimena Trail over the Winding Stair Mountains is on the south side of the Basin. The State of Oklahoma has a park near the center of the Basin at the Corps of Engineers Wister Reservoir that draws a large number of visitors each year. The Forest Service manages facilities in the Ouachita National Forest that are being expanded because of the pressure being exerted. The recreational opportunities that will be offered, along with the natural beauty of the Basin, will have an appeal to people from large cities in a 200 to 300 mile radius.

PROGRAM BENEFITS AND COST

The benefits from the USDA programs are both monetary and nonmonetary. The benefits from land treatment will have a measurable effect on the reduction of flooding and sediment damage to flood plain lands. The reduction of runoff, erosion, and sediment production from the application of these measures is vital in maintaining and extending the physical and economic life of the upstream and downstream structural measures. Research and past experience have shown benefits from land treatment greatly exceed the cost of application.

Flood prevention benefits will accrue from the installation of the proposed structures. Almost 20,000 acres of bottomland on the tributary watersheds will be protected from damaging overflows. Benefits will be largely from the reduction of floodwater damages to crops and pastures and enhancement of bottomlands for increased production. The flood prevention benefits were based on reductions of flood plain damages and more intensive use of these lands. The damage reduction benefits were determined as the difference between the estimated average annual damage with and without the proposed structures.

Estimates were made for benefits from recreational developments, redevelopment benefits expected from project installation and operation, and secondary benefits. The benefits from the reduction of floodwater damages on the main stem flood plain lands were evaluated and included for project justification. Procedures for making these determinations are discussed in the Appendix.

The benefits to the proposed projects are shown in table 23 on the following page.

Table 23 - Comparison of Benefits and Costs for Structural Measures
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Watershed	Average Annual Benefits 1/	Average Annual Cost	Benefit-Cost Ratio
Black Fork Creek	130,383	108,354	1.2:1
Combined Creeks	132,956	105,678	1.3:1
James Fork Creek	201,504	137,333	1.5:1
Brazil Creek	55,645	48,000	1.2:1

1/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of $16,586 annually.

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VIII. PROGRAMS NEEDED FOR FURTHER DEVELOPMENT

The USDA programs of land treatment and management with water resource developments, including authorized Public Law 566 plans and proposed projects, operating with the Corps of Engineers programs will go far in meeting the needs of the Basin. In formulating and developing the project plans, consideration was given to all available means of fulfilling the existing or projected needs by the year 1980. The plan described in this report is considered to be the most practical and economical means of supplying these needs. It is, however, necessary to implement and accelerate the installation of the works of improvement by improving the existing programs as well as changing criteria and legislation to further develop the water and related land resources in the Basin.

PROGRAM IMPROVEMENT

Land and Water Resource Developments

There is an urgent need to accelerate the installation of the land treatment and upstream structural measures for watershed protection and flood prevention and to develop the high level of management of these resources to insure optimum sustained production. It is estimated that 30 percent of the land treatment practices and 14 out of 74 upstream structures have been installed in the Basin.

The USDA programs emphasizing effective long-range conservation of water and related land resources cannot be accomplished without an informed and concerned public. An educational and information program should be initiated to provide for an aggressive leadership, enlisting the cooperation of individuals and communities, and motivating the accomplishment of these goals. These programs also should seek to improve the attitudes of the people in the conservation of the Basin's resources.

Soil Information

Soil surveys of the Basin area should be completed at an early date and will serve as a basis for sound planning of urban land use and recreational development. This information and the interpretation of these data would benefit urban planners, developers, and municipal or county officials regarding advantages, limitation, and location of soils suitable for housing, recreation, road construction, and waste disposal.

Fire Prevention

The application of land treatment on cropland, pastures and rangeland, and on the forested lands in the Basin, with a high level of management, will improve watershed conditions. The additional cover on the agricultural land and the buildup of burnable material on the forest floor will make fire prevention and control more difficult. With more resident population and increased numbers of tourists and recreationists, the hazard of starting fires will be greater.

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There will be an ever increasing need to extend and strengthen the fire prevention programs. The protection of pasture and rangeland should be considered in conjunction with forest land in these programs. There is a need to consider the storage of water supplies required for fire prevention and control. An educational program should be expanded to encourage the change in attitude toward better land management and the protection of those resources from fires.

Recreational Development

Water-oriented recreation-day demands for the Basin were estimated by the Corps of Engineers. Projections indicate by the year 2020 the recreational visitor-days will exceed 5 million annually. Recreational opportunities provided in USDA and Corps of Engineers programs are estimated to be about 2 million visitor-days annually.

It is recognized that these estimates are not conclusive and that the unsatisfied demand cannot be accurately determined; however, planning guidelines are needed for these resources. Educational programs should be initiated to inform farmers with small holdings of the possibilities of income-producing enterprises. There are excellent potentials for private owners to maintain and improve habitat, to provide for game and nongame wildlife species on agricultural and forested lands, and to derive income from the associated hunting opportunities.

ALTERNATIVE APPROACHES

Forest Management Implementation

Much of the privately owned forest lands will require rehabilitation through proper and intensive forest management. This assistance is available through the State forestry organization of Arkansas and Oklahoma, in cooperation with the U.S. Forest Service; however, there have been few requests compared with the total needs. The lack of economic incentive, the basic problem, must be overcome before any appreciable amounts of forest management are achieved. A number of factors contribute to lack of economic incentive and has been stated previously under "Forest Resource Problems." A number of projects or programs might be proposed, with the ultimate solution to those problems as the objective.

Increase Size of Holdings - Many of the private forest land ownerships are too small for efficient profitable management on an individual basis. Acquiring more land might solve this problem for some owners. Long-term loans for forestry purposes are made by the Farmers Home Administration to eligible small woodland owners. An example of a recent loan is described in an excerpt from a newspaper, Appendix, page 124. This loan enabled the owner to purchase more forest land, to install good management practices, and be provided funds while he builds up his forest resources.

Forestry Cooperatives - The problem of small ownership might be improved with the development of forest cooperatives. Associations of woodland owners involving game and wildlife management, income-producing recreational

enterprises, as well as timber production, will increase monetary returns. The careful management of the forest resources could, in turn, result in an increase in dependable wood supplies needed by forest industries.

Forestry cooperatives would tend to improve forest management on small woodlands and increase the standards of living by:

1. Bringing together in a single unit sufficient resources and capital for efficient management.

2. Providing, through coordinated management, a degree of mechanization that would not be practical for individuals.

3. Helping encourage multiuse management of forest lands for greater returns and more frequent income.

4. Providing marketing advice, services, and outlets to increase the bargaining power of the individual landowners.

5. Supplying the raw materials for new or expanded industry.

6. Providing employment opportunities for local residents.

7. Providing a source of labor to perform work related to developing, improving, maintaining, harvesting, marketing, and utilizing forest resources.

Establishing a successful forest cooperative is not an easy task. Identifying whether one is needed is the most difficult and crucial phase of organizing such a cooperative. Studies are recommended to determine the feasibility of forestry cooperatives in the Basin.

Economic Development

There are several resource conservation programs which could make a significant contribution to the region. The acceleration of the current conservation activities plus the use of new authorities will provide additional economic opportunities for the people of the area. Local initiative and leadership will be the first essential in developing the economic program requirements of the Basin and in sound resource planning and development. All available recreational programs should be utilized in developing these resources.

The Ozarka Regional Project authorized under the Public Works and Economic Development Act of 1965 including parts of Oklahoma, Arkansas, and Missouri will have an impact on the Basin. The implementation of this program should make significant increases in industry, recreation, and associated business activity.

NEW LEGISLATION AND CHANGES IN POLICY OR CRITERIA

Public Law 566

Changes in basic laws and policies are necessary to liberalize the determination of the flood prevention benefits. Consideration should be given to changes in land use and enhancement-type benefits.

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An amendment to the Act is needed to permit the use of funds other than Public Law 566 in the cost-sharing of multipurpose structures on that part of programs not supported by Federal grants.

Housing developments around recreational reservoirs and urban expansion in the upstream areas will create problems of stream and reservoir pollution. The potential for industrial development in these areas also exists. Change in criteria to provide for cost-sharing of water storage to alleviate these problems is a requisite.

Strip Mines

The appearance of our countryside is the concern of all Americans. There are 6,200 acres of land in the Basin which have been strip mined for coal. Unfortunately, these areas were practically abandoned in a rough pitted condition with the topsoil mixed with or covered by the subsoils of low fertility. Mining was completed on most of the area several years ago; meanwhile, the area remains idle, creating a blight to the community. New legislation to give assistance to the local groups to completely rehabilitate the mined-over areas for beneficial uses such as recreation, fish and wildlife, would at the same time beautify the countryside.

Forestry Legislation

Since forest industry is characterized by long-term investments before beneficial returns can be realized, the economic incentive to rehabilitate forest lands might be provided by enacting legislation using some features of existing programs, i.e., Agricultural Conservation Program (ACP), Soil Bank Program, or the Naval Stores Conservation Program. Possibilities to consider are to increase the Federal Government's share of ACP cost-sharing for establishing forestry practices or combine regular ACP cost-sharing with a "contract" providing an annual payment to the landowner for periods of 10 to 15 years.

Poteau River Basin Authorization

It is recommended by the Field Advisory Committee that supplemental legislation be enacted which would authorize the Secretary of Agriculture to implement the proposed USDA programs simultaneously with those proposed and recommended by the Department of Army, Corps of Engineers.

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APPENDIX

APPENDIX CONTENTS

TABLES

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APPENDIX

Poteau River Basin Report in Oklahoma and Arkansas

This appendix contains material to supplement the Basin Report. It includes informational data and the procedures used in making the investigation and analysis for the study. Inventories are listed of the present (1965) resources and developments and the potential use and development of the land and the related water resources of the Basin for 1980 and 2020.

This section will provide information on land use distribution, agricultural production cost, crop yields, population estimates, and forestry definitions. The land treatment program being applied and the programs needed for full resource development for the major land use categories are shown in tables.

An analysis of the upstream structural measures needed in the next 10 to 15 years, with structural requirements and cost estimates on feasible projects, was developed. Design criteria and procedures used in estimating the cost of the structural needs, with information relating to cost allocation, structural cost distribution, structural data, and recreational data, are also included in this section.

The material is organized under broad categories of subject matter to facilitate use. References are cited under appropriate subject matter headings as follows:

1. Cover Condition, Land Use, and Land Treatment.
2. Economics.
3. Water Supply Needs.
4. Investigation and Analysis.
5. Proposed Projects.
6. Recreational Data.
7. Definitions and References.

COVER CONDITION, LAND USE, AND LAND TREATMENT

The principal factors influencing present watershed conditions are: (1) soils, (2) quality of cover, and (3) management, including the use of land according to its capability. The cover conditions and the land use of the Basin were determined from data furnished by work units of the Soil Conservation Service and field offices of the Forest Service, by soil scientists, by study of work plans developed for watersheds in the Basin, and by detailed field investigations made by both services. James Fork and Caston-Mountain creek watersheds were selected for detailed studies to determine quality of cover, the management and land use practices, and the forest hydrologic conditions.

The land use in the Basin was determined from: (1) Conservation Needs Inventory for Oklahoma and Arkansas; (2) Sampling of soil survey information; (3) Public Law 566 watershed work plans which have been developed; (4) Acreage furnished by the Forest Service on National Forest lands; (5) Forest survey data; (6) State Statistical Crop Reporting Service; and (7) U.S. Census of Agriculture.

The land use was determined in four broad categories consisting of cropland, pasture and rangeland, forest and woodland, and miscellaneous use. The amount of land in each use was estimated for the watersheds by counties and is shown in table A1. Table A2 shows the land in each county by land use. The Ouachita National Forest, containing 213,245 acres in the southern part of the Basin, is Federally owned land. Nister Reservoir area, located in the central part of the Basin, containing 39,150 acres, is also Federally owned.

Land Use According to Capability

The land capability classification is a systematic arrangement of different kinds of soils according to those properties, including slope and degree of erosion, that limit or restrict the use or determine the ability of the land to produce permanently without deterioration. The groupings used are characterized by differences in hazards and limitations of safe use and management of the land. There are eight land capability classes, with class I through IV being suited for cultivation and class V through VIII best suited for range, forestry and wildlife areas. The distribution of land use according to land capability classification is shown in table A3. The land use considered was cropland, pasture and range, and forest and woodland. Land in miscellaneous use or Federally owned land was not included in the estimates.

Land Treatment Needs

The land treatment practices that have been installed in the tributary watershed and on the Poteau River main stem were estimated from an inventory made of the application of these measures. The practices which have been installed in recent years by the landowners and operators were determined from the records in the field offices of the Soil Conservation Service and the Forest Service. The estimated acreage of the conservation treatment on cropland, pasture and rangeland, and forest and woodland, along with the estimated expenditures made by farmers and ranchers in carrying out these practices, is shown for each tributary watershed and study area in table A4.

The measures needed in the next 10 to 15 years to develop the resources in the Basin were determined from the inventory of practices applied to date, the Basin trends, and projections made for the future use of the land. Table A5 shows the acreage of land treatment needed in the next 10 to 15 years for each tributary watershed and study area in the Basin and the estimated cost of the application of these measures. The land treatment measures are needed to furnish watershed protection and flood prevention. These practices will be significant in increasing the useful life of the upstream as well as the downstream structural measures needed in the Basin.

A list of conservation practices, the extent to which these practices have been applied, and the estimated cost of the application of the measures are shown in table A6. The table also shows an estimated need for these measures by 1980, and the estimated cost for the application.

Table A1 - Land Use by Watersheds and Counties
Poteau River Basin, in Oklahoma and Arkansas

Watershed	County	Cropland 1/	Pasture Range	Forest Woodland	Misc.	Total
1. Upper Poteau River	Scott	25,320	32,010	115,830	2,970	176,130
	LeFlore	1,300	1,900	7,630	500	11,330
Suotota1		26,620	33,910	123,460	3,470	187,460
2. Black Fork Creek	LeFlore	4,300	8,020	77,375	2,065	91,760
	Scott	1,270	3,000	26,005	315	30,590
	Polk	-	-	10,744	320	11,064
Subtotal		5,570	11,020	114,124	2,700	133,414
3. Holston-Reichert-Conser Creeks	LeFlore	1,930	8,630	78,492	8,740	97,792
Subtotal		1,930	8,630	78,492	8,740	97,792
4. Fourche Maline Creek	Latimer	10,310	19,350	115,384	4,100	149,144
	LeFlore	1,000	5,600	19,416	200	26,216
Subtotal		11,310	24,950	134,800	4,300	175,360
5. Caston-Mountain Creek	LeFlore	3,000	6,200	37,488	1,165	47,853
Subtotal		3,000	6,200	37,488	1,165	47,853
6. Combined Creeks	LeFlore	8,000	16,000	71,408	2,640	98,048
	Sebastian	2,100	2,515	15,109	500	20,224
Subtotal		10,100	18,515	86,517	3,140	118,272
7. James Fork Creek	Sebastian	16,200	18,625	65,740	5,675	106,240
	LeFlore	3,500	5,000	23,035	1,200	32,735
Subtotal		19,700	23,625	88,775	6,875	138,975
8. Brazil Creek	LeFlore	12,200	17,500	54,180	2,700	86,580
	Latimer	3,020	5,630	32,970	1,800	43,420
	Haskell	3,400	7,860	10,340	500	22,100
Subtotal		18,620	30,990	97,490	5,000	152,100
9. Poteau and Heavener Laterals	LeFlore	5,740	9,280	35,140	8,100	58,260
	Latimer	440	710	3,280	50	4,480
Subtotal		6,180	9,990	38,420	8,150	62,740
10. Spiro and Bonanza Laterals	LeFlore	8,090	14,040	16,670	1,500	40,300
	Sebastian	800	1,480	2,184	7,390	11,854
Subtotal		8,890	15,520	18,854	8,890	52,154
11. Main Stem Flood Plain	LeFlore	16,930	11,550	9,020	4,700	42,200
Subtotal		16,930	11,550	9,020	4,700	42,200
Basin Total		128,850	194,900	827,440	57,130	1,208,320

1/ This includes 63,555 acres of Improved Pasture and 12,859 acres of Abandoned Cropland Grazed.

Table A2 - Land Use by Counties and States
Poteau River Basin, in Oklahoma and Arkansas

State	County	Cropland	Pasture Range	Forest Woodland	Misc.	Total
Oklahoma	LeFlore	65,990	103,720	429,854	33,510	633,074
	Latimer	13,770	25,690	151,634	5,950	197,044
	Haskell	3,400	7,860	10,340	500	22,100
Subtotal		83,160	137,270	591,828	39,960	852,218
Arkansas	Sebastian	19,100	22,620	83,033	13,565	138,318
	Scott	26,590	35,010	141,835	3,285	206,720
	Polk	-	-	10,744	320	11,064
Subtotal		45,690	57,630	235,612	17,170	356,102
Basin Total		128,850	194,900	827,440	57,130	1,208,320

Table A3 - Land Use by Capability Class and Subclass - 1965
Poteau River Basin, in Oklahoma and Arkansas

Capability Class	Soil Unit	Cropland	Pasture Range	Forest Woodland	Total 1/
I	4h	-	621	-	621
	7	101	-	-	101
	8p	1,706	-	-	1,706
	9p	1,706	-	-	1,706
	9h	406	-	-	406
Subtotal		3,919	621	-	4,540
IIe	6	9,405	15,333	2,956	27,694
	6k	15,730	2,485	1,532	19,747
	7	247	20,163	7,240	27,650
	7k	2,797	1,492	959	5,248
	7d	2,121	576	246	2,943
Subtotal		30,300	40,049	12,933	83,282
IIs	5	2,002	5,175	-	7,177
Subtotal		2,002	5,175	-	7,177
IIw	8	17,280	6,681	11,892	35,853
	9	9,995	3,767	4,793	18,555
Subtotal		27,275	10,448	16,685	54,408
IIIe	5	160	278	187	625
	6	1,971	2,589	1,412	5,972
	6k	2,713	2,650	2,283	7,646
	7	25,330	22,721	15,446	63,497
	7k	1,411	1,278	1,275	3,964
	20	11,994	10,644	7,822	30,460
Subtotal		43,579	40,160	28,425	112,164
IIIw	3 & 3a	1,099	1,359	918	3,376
	5a	608	297	796	1,701
	8a	13,577	8,944	18,292	40,813
Subtotal		15,284	10,600	20,006	45,890
IVe	6	32	483	353	868
	6k	64	1,221	650	1,935
	7	2,257	15,230	8,656	26,143
	7k	967	1,233	652	2,852
	20	1,196	16,978	9,852	28,026
Subtotal		4,516	35,145	20,163	59,824
V	9b	683	5,903	27,321	33,907
Subtotal		683	5,903	27,321	33,907
VI	6k	-	691	664	1,355
	7	578	10,788	7,041	18,407
	7k	-	1,065	297	1,362
	20	714	14,206	10,637	25,557
Subtotal		1,292	26,750	18,639	46,681
VII	25c	-	4,913	331,154	336,067
	27	-	1,536	121,869	123,405
Subtotal		-	6,449	453,023	459,472
Total		128,850	181,300	597,195	907,345

1/ This table does not include 48,580 acres in Miscellaneous Use, 213,245 acres in Ouachita National Forest, and 39,150 acres in Wister Reservoir area.

Table A4 - Land Treatment Applied to Date
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Cropland		Pasture & Rangeland		Forest & Woodland		Misc. Wildlife & Rec.	
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost
1. Poteau River	2,235	68,200	16,300	542,600	10,500	99,800	1,930	38,600
2. Black Fork Creek	525	16,000	7,480	248,800	7,400	65,100	520	10,400
3. Holston-Reichert Conser Creeks	210	6,400	3,570	118,700	6,100	53,300	775	15,500
4. Fourche Maline Creek	4,210	128,400	20,200	672,400	900	8,400	3,870	77,400
5. Caston-Mountain Creek	475	14,500	3,900	129,700	1,400	8,400	520	10,400
6. Combined Creeks	1,240	37,800	10,000	332,800	2,300	21,400	1,030	20,600
7. James Fork Creek	4,870	148,500	17,800	592,500	2,400	22,700	3,870	77,400
8. Brazil Creek	2,390	73,000	20,080	668,400	2,600	24,100	1,940	38,800
9. Poteau & Heavener Laterals	630	19,200	11,160	371,400	1,400	13,100	640	12,800
10. Spiro & Bonanza Laterals	1,115	34,000	10,050	334,400	600	5,300	775	15,500
11. Main Stem Flood Plain	2,100	64,000	4,460	148,300	400	2,400	130	2,600
Total	20,000	610,000	125,000	4,160,000	36,000	324,000	16,000	320,000

Table A5 - Land Treatment Needed in the Next 10 to 15 Years
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Cropland		Pasture & Rangeland		Forest & Woodland		Misc. Wildlife & Rec.	
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost
1. Poteau River	9,780	250,500	20,300	773,800	6,800	88,000	7,140	445,000
2. Black Fork Creek	2,660	68,100	10,100	385,200	9,000	151,500	5,950	370,800
3. Holston-Reichert Conser Creeks	1,050	26,900	4,600	175,700	8,000	130,100	4,760	296,700
4. Fourche Maline Creek	4,740	121,500	29,000	1,105,300	16,000	144,000	6,000	373,900
5. Caston-Mountain Creek	1,660	42,500	7,500	286,200	14,500	90,500	1,070	67,800
6. Combined Creeks	4,635	118,000	20,300	773,800	18,000	223,400	3,000	186,900
7. James Fork Creek	4,230	108,300	16,800	640,500	10,000	127,900	7,700	479,800
8. Brazil Creek	3,425	87,700	31,900	1,215,800	18,000	239,500	4,160	259,200
9. Poteau & Heavener Laterals	3,325	85,100	5,800	221,400	8,000	101,100	3,600	224,300
10. Spiro & Bonanza Laterals	4,030	103,200	6,400	244,300	4,000	51,900	3,500	218,100
11. Main Stem Flood Plain	9,465	243,200	2,300	88,000	700	13,100	120	7,500
Total	49,000	1,255,000	155,000	5,910,000	113,000	1,361,000	47,000	2,930,000

Table A6 - Land Treatment Practices and Estimated Cost
Poteau River Basin, in Oklahoma and Arkansas

Item	Unit	To Date		Needed Next 10 to 15 Years	
		Number Applied	Estimated Cost	Number	Cost
			CROPLAND		
Conservation Cropping System	Acre	19,000	266,000	49,000	684,600
Contour Farming	Acre	1,500	1,500	5,400	5,400
Cover and Green Manure Crops	Acre	11,050	166,000	19,800	297,000
Crop Residue Use	Acre	18,400	27,300	40,600	61,000
Drainage Field Ditches	Mile	31	12,900	100	40,000
Drainage Main or Laterals	Mile	14	19,800	35	35,000
Grasses & Legumes in Rotation	Acre	5,400	109,000	4,000	119,600
Terrace, Gradient	Mile	28	7,500	47	12,400
Subtotal			610,000		1,255,000
			PASTURE AND RANGELAND		
Drainage Field Ditches	Mile	120	40,000	500	170,000
Drainage Main or Laterals	Mile	40	50,000	115	160,000
Brush and Weed Control	Acre	50,000	211,700	140,000	621,500
Farm Ponds	No.	2,500	819,400	1,650	544,500
Fishpond Stocking	No.	750	7,500	1,830	18,300
Fishpond Management	No.	180	1,800	2,630	26,300
Pasture & Hayland Renovation	Acre	20,800	519,300	114,000	2,863,200
Pasture & Hayland Planting	Acre	94,000	2,351,200	40,000	1,006,300
Pasture & Hayland Management	Acre	53,000	79,500	177,000	265,700
Range Proper Use	Acre	77,600	77,600	157,800	157,800
Range Seeding	Acre		2,000		76,400
Subtotal			4,160,000		5,910,000
			FOREST AND WOODLAND		
Establish Timber Stand	Acre	3,400	68,000	28,700	540,000
Timber Stand Improvement	Acre	32,500	244,000	89,300	715,400
Control of Grazing	Acre	-	-	30,800	57,500
Erosion Control	Acre	6	800	696	41,900
Roadbank Stabilization 1/	Mile	-	-	3	800
Stream Channel Clearing 1/	Mile	3	1,000	4	1,300
Old Road and Skidtrail Stabilization 1/	Acre	58	10,500	22	4,400
Subtotal			324,300		1,361,300
			WILDLIFE AND RECREATION		
Recreational Areas	Acre	250	50,000	10,800	2,160,000
Wildlife Habitat Development	Acre	4,200	210,000	9,200	460,000
Wildlife Habitat Preservation	Acre	12,000	60,000	38,000	190,000
Strip Mine Spoil Areas	Acre	-	-	4,000	120,000
Subtotal			320,000		2,930,000
Total			5,414,300		11,456,300

1/ In Ouachita National Forest.

ECONOMICS

Crop Production

It is estimated that the land to be used for the production of crops amounts to about 128,850 acres. This estimate includes 27,055 acres of hay crops, 63,555 acres of improved pastures, and 12,859 acres of abandoned cropland which are being grazed. The acreage of crops being grown in the Basin and the distribution by counties are shown in the following table:

Table A7 - Crop Distribution
Poteau River Basin, in Oklahoma and Arkansas

Crops	Oklahoma			Arkansas		Total
	LeFlore County	Latimer County	Haskell County	Sebastian County	Scott County	
Wheat	1,000	182	73	200	-	1,455
Small Grain	1,500	97	48	194	388	2,227
Corn	650	582	36	100	654	2,022
Feed Grain	1,000	600	109	400	300	2,409
Cotton	676	132	76	100	346	1,330
Soybeans	3,000	775	-	800	100	4,675
Alfalfa	1,500	127	-	450	205	2,282
Fruits & Vegetables	1,000	184	46	300	230	1,760
Sericea	2,847	666	182	1,150	1,212	6,057
Other Hay Crops	15,000	1,990	1,183	3,500	5,382	27,055
Orchards	600	42	17	70	40	769
Peanuts	300	12	7	36	40	395
Improved Pasture	30,486	6,641	1,273	10,000	15,155	63,555
Abandoned Cropland Grazed	6,871	1,300	350	1,800	2,538	12,859
Total	66,430	13,330	3,400	19,100	26,590	128,850

Population

The changes in population during the period 1910 to 1960 from rural to urban in the Basin are shown in table A8. The entire population for LeFlore, Latimer, and Haskell counties, Oklahoma, and Sebastian and Scott counties, Arkansas, was used in the table to show the trends in population changes.

Table A8 - Population Characteristics Summary
for the Basin and Surrounding Area
Poteau River Basin, in Oklahoma and Arkansas

Area	1910	1920	1930	1940	1950	1960
AREA						
Oklahoma	59,323	76,028	70,290	75,570	55,279	45,965
Arkansas	66,580	70,971	66,229	76,109	74,259	73,982
Total	125,903	146,999	136,519	151,679	129,538	119,947
MUNICIPAL						
Oklahoma	12,744	16,728	15,450	17,619	20,262	18,882
Arkansas	32,380	37,530	31,626	45,431	55,824	60,244
Total	45,124	54,258	47,076	63,050	76,086	79,126
NONMUNICIPAL						
Oklahoma	46,579	59,300	54,840	57,951	35,017	27,083
Arkansas	34,200	33,441	34,603	30,678	18,435	13,738
Total	80,779	92,741	89,443	88,629	53,452	40,821

SOURCE: Bureau of the Census.

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Forestry

The following article from the Hugo Daily News dated February 22, 1966, illustrates a method of financing woodland operations:

"A first in the state of Oklahoma was accomplished today by the local office of the Farmers Home Administration.

"A $50,000 loan was made to Willard Adams, local farmer, for forestry purposes. The loan will enable Adams to refinance land he already owns and to purchase another tract outright.

"The combined timber operation of Adams will be composed of 1,890 acres. The nature of forest products in slow growth enables the Farmers Home Administration to make long-term loans at a lower interest rate.

"THE COMBINED agencies of the Department of Agriculture has, or will have had a part in preparation or servicing of the loan. The forestry division of the Oklahoma State Department of Agriculture submitted a detailed forest management plan for Adams to follow. Technicians trained in forestry spent several days making timber surveys of the timbered area.

"Local Soil Conservation personnel did a lot of planning on conservation of the soil and other natural resources. They worked closely with the forestry division of the Oklahoma State Department of Agriculture.

"THE LOCAL OFFICE of the Agricultural Stabilization Conservation Service will furnish cost sharing for timber stand improvement and other improved forestry practices carried out on the farm. Plans for this operation call for the improvement of 500 acres by poisoning, with Diesel and 245-T, undesirable trees to make room for more desirable ones which would consist of pine.

"In the above mentioned tract there are 1,183 acres to be protected for grazing and damage by fire. The fire protection will be carried out by maintaining trails and fire guards.

"Another area consisting of 387 acres will be improved by harvesting of marketable timber. Safety factors involved here are to protect from over-grazing and fire. The Sobol fire tower is within four miles of the tracts that comprise the farm.

"An area consisting of 295 acres will require the planting of 295,000 pine tree seedlings at a cost of $1,180. Also, the tract will have the undesirable trees removed by the use of Diesel and 245-T.

"ADAMS CAN EXPECT: A gross return of $21,850, total of post harvest in the first five cuts made, prior to October 1970.

"An additional $21,850 total of post harvest in the next five cuts beginning in 1976 and ending in 1980.

"Another $21,850 for the next 5 years ending in October 1985, total post harvest $65,500.

"Saw log harvest from pine saw logs starting the cutting in 1975 through 1980, $6,210.

"Saw log harvest from hardwood saw logs by year 1980, total cash return by 1980, $88,260.

"'We do not wish to imply that money grows on trees, but if that is an impression we have left, remember dollars are shaken off in the harvesting and marketing process,' an FHA spokesman said. In other words, a forest product selling for $10 will cost $5 for harvesting and marketing alone.

"PERSONNEL of the Farmers Home Administration did the planning, processing and appraisal work for Adams' loan. 'We are fortunate in our agency to have the services of competent appraisers that understand the value of farm real estate,' the spokesman said. 'The Farmers Home Administration is happy to have had a part in this worthwhile project of making available to future generations lumber products, a very vital basic building material.'"

Improved Pastures

Improved pasture yields that have been obtained in Oklahoma are illustrated in the following article:

Winter Pastures - Wewoka Creek

"Hays Stafford - farmer-rancher says, 'I purchased about 900 acres along Wewoka Creek in the Hughes County Soil and Water Conservation District during the past several years. About ½ of this formerly overflowed. I am planting this to bermuda, lespedeza and hop clover on the upland and fescue overseeded to ladino clovers on the bottomlands. This has proven to be a very satisfactory combination for me. Bermuda has been my standby for a long time but I have only started fescue and ladino the last few years. I have planted about 92 acres of this pasture so far and it has given me excellent returns especially the last two years.

"In the fall of 1961 I put 90 heifers weighing an average of about 300 pounds in a 54 acre fescue pasture late in September. They were kept there until the middle of January, with no additional feed except for hay during one snow. These heifers gained an average of 100 pounds each when weighed out and sold or a total of 9,000 pounds. In late March I put 45 steers in this same pasture and took them out in June, they gained an average of 125 pounds each or a total of 5,625 pounds. This made a total of 14,625 pounds of gain. The sale price of the steers and heifers averaged .25¢ per pound, making a total income of $67.71 per acre for the cool season grazing period from September to June. All of this was accomplished when I would ordinarily have been feeding hay and protein to my cattle.'

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"Mr. Stafford continues, 'The past fall, 1962, I put 65 steers and heifers in the same pasture, weighing about 300 pounds. The 33 steers were taken out in December and sold at .30¢ per pound. They gained an average of 125 pounds each, with no additional feed or $22.92 per acre plus the gain put on the heifers.

"Perhaps fescue is not the most palatable of grasses but I know from experience that it will put on good gains at a very low cost, and after all profit is what the cattleman wants. I know fescue has paid off for me.'

"Regarding his land Mr. Stafford says, 'I have often been asked to price my land on Wewoka Creek but I have refused as I need it in my program. Where else could such good land be found? Some have complained about the assessments for benefits on the Wewoka Creek Project as being too high. Not me. I will pay about $6,000.00 but I believe it is the best way I could spend my money, as I did not worry about floods in 1961 or 1962, and do not expect to worry about floods in the future.'"

WATER SUPPLY NEEDS

Multipurpose Structures

In a number of the watersheds, it was found that ground water sources or the present surface sources are not sufficient to meet the future water needs for the towns and communities in the upstream areas. The development of surface water resources was considered to be the most practical and economical means of meeting these requirements. The need of structures for flood protection and the requirements for municipal water supply storage can be met, in many instances, by multipurpose structures. There also are needs for developments which will afford water supplies for fish and wildlife, recreation, and other beneficial uses as project purposes. Single-purpose and multipurpose structures for each watershed are listed in the following table:

Table A9 - Upstream Structural Needs
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Single-Purpose	Multipurpose Sites			Total
	(FP) Sites	Fish & WL	Recreation	Municipal	
Poteau River 1/	18	-	-	1	19
Black Fork Creek	2	3	-	-	5
Fourche Maline Creek 1/	10	-	2	2	14
Caston-Mountain Creek 1/	4	-	-	1	5
Combined Creeks	6	-	2	1	9
James Fork Creek	5	-	6	6	17
Brazil Creek	5	-	-	-	5
Total	50	3	10	11	74

1/ Public Law 566 Watershed Work Plan developed.

Water Requirements for Wood Processing

The water requirements for the wood processing industries located in the Basin were not evaluated. The following table, however, lists the water supply needs for the plants in the Basin or that may be located in or near the area within the next 10 to 15 years.

Table A10 - Water Requirements of Wood Processing Industries
Poteau River Basin, in Oklahoma and Arkansas

Produce and Type of Operation	Product Unit	Water Requirement	Consumptive Use
		(gallons)	
Pulp and Paper: 1/			
Pulping Process:			
Sulfate			
Unbleached	Ton, Wood Pulp	35,000	4/
Bleached	" " "	50,000	Neg.
Semi-chemical			
Unbleached	" " "	10,000	4/
Bleached	" " "	30,000	Neg.
Groundwood	" " "	10,000	314
Insulation Board	Ton	8,000	235
Hardboard	"	10,000	235
Lumber: 2/			
20+ MBP Daily Capacity	Thousand Bd. Ft.	1,500	4/
Smaller Mills With Dry Kiln and Planer Facilities	" " "	800	4/
Small, Semi-portable Mills	" " "	15	4/
Veneer 3/	Thousand Sq. Ft.	130	4/
Wood Preservation 3/	Thousand Cu. Ft.	7,000	4/
Other Primary and Secondary Wood Processing Plants 3/		Usually Minor	

1/ Forest Products Laboratory, U. S. Forest Service.

2/ Geo. W. Stanley, Kirby Lumber Corp. What Water Means to the Forest Industries, Forest Farmer, XVI:2. November 1956.

3/ Texas Forest Service.

4/ Not available, but probably negligible.

INVESTIGATION AND ANALYSIS

Engineering Investigations

After considering the effect of land treatment measures, determinations were made for the structural measures needed during the next 10 to 15 years and the upstream measures needed for long-range water resource development. Generalized planning and design criteria compatible with Public Law 566 planning technique were used as guides in planning and estimating the cost of the upstream projects. These criteria, together with the data obtained from stereoscopic study of photographs, topographic maps, and field investigations of each site, are considered adequate for the preliminary designs and cost estimates. The final design and analysis in connection with the preparation of detailed construction plans will require more specific criteria and detailed data on conditions at individual sites.

The least costly system of structural measures to meet the needs for Basin development was selected from the structure sites studied. The study and the investigation made and the procedures used in the determination were as follows:

1. Base maps of the tributary watersheds were prepared showing the watershed boundaries, drainage patterns, roads, and other related data. A stereoscopic study of aerial photographs, a map study of U.S.G.S. quadrangle sheets, and a field reconnaissance were used in the location of the possible sites.

   The drainage area of the structure sites was determined from a stereoscopic study of 4-inch aerial photographs. Storage capacities were developed from field surveys of the sites. Quadrangle sheets of the 7½ minute series were available for the eastern part of the Basin, 15 minute series for the southern part, and for Brazil Creek 50-foot contour interval sheets were used. Field surveys were made on the problem structure sites.

2. Structure site data were developed on the sites studied, including: the drainage area of the site, the storage capacity, embankment volume, and other pertinent information. These data were used to develop preliminary designs and for tentative cost estimates of each structure. The system of structural measures needed for each tributary watershed was then determined from: needs for flood protection, needs for multipurpose storage, and an analysis of costs and benefits.

3. Floodwater detention capacity to detain temporarily the runoff from a 25-year frequency storm for class (a) structures, for class (b) structures a 50-year frequency storm, and a 100-year frequency storm for class (c) structures was provided in all structures included in the Basin plan. The runoff from these storms was determined by a regional analysis of stream gage records in areas of similar geologic formation, topography, and average annual rainfall. Sediment capacity was provided in the structures for a 100-year expected life.

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4. The storage capacities needed in multipurpose structures for municipal storage were estimated in most cases by private engineers. In a few instances, the needs of the towns or communities were estimated from a comparison with projects in the Basin that were planned by private engineers. Yields for the planned water supplies were compared to projects for which private engineers have provided firm yield estimates. Recreational storage needs were based on the surface area of the lakes needed for recreational use in each area. Fish and wildlife storage was estimated from the requirements for supplemental flow of the streams. This was based on the capacity needed to store water for release for a 5-month period, which would produce flows of 30 c.f.s. in Black Fork Creek after streambed and evaporation losses.

5. Embankment volumes were computed assuming 2½ to 1 side slopes, 5 percent consolidation, and a 10-foot berm on the upstream slope at the top of the riser elevation. Cost estimates were based on computed embankment volume times a base unit cost. Unit costs were estimated from field investigations of the site conditions. Contingencies were added in the unit cost.

6. Operation and maintenance costs of the structures were based on the costs of similar structures installed on other watersheds and projected on a long-term basis.

Hydraulic and Hydrologic Analysis

The following steps and procedures were used as a part of the hydraulic and hydrologic investigations and determinations.

Basic meteorologic and hydrologic data were tabulated from U.S. Weather Bureau Climatological Bulletins, U.S. Geological Survey Water Supply papers, and other Weather Bureau publications. These data were analyzed to determine average precipitation, seasonal distribution of precipitation, annual gaged runoff, storm durations, and other pertinent data.

Investigations of rainfall recording gages located within the Basin indicated most flood-producing storms were approximately of a 12-hour duration. Technical Paper No. 40, U.S. Weather Bureau, was used to determine the 12-hour duration 25-, 10-, 5-, and 2-year frequency storms. The rainfall pattern of these storms was assumed to be the "B" storm distribution.

The present hydrologic conditions of James Fork Creek and Caston-Mountain Creek were determined by use of existing soil surveys, work unit land use and treatment records, and other pertinent information contributed by the Staff Geologist and Work Unit Conservationist.

Present hydrologic conditions for the forest lands in these watersheds were determined by the U.S. Forest Service by a systematic field survey. The future hydrologic conditions of these watersheds were determined from information furnished by the Work Unit Conservationists showing the expected changes in land use with an accelerated land treatment program.

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Future hydrologic conditions for the forest lands also were furnished by the U.S. Forest Service. Hydrologic conditions for the remaining watersheds in the Basin were determined, with the cooperation of the Staff Geologist, by expanding existing hydrologic data. Runoff curve numbers computed for each watershed were used with Technical Release No. 16, Rainfall-Runoff Tables for Selected Runoff Curve Numbers, to determine the amount of runoff for various size storms.

Engineering surveys, based on mean sea level elevations, were made of channel and valley cross sections on James Fork and Caston-Mountain creeks. These valley sections were selected for adequate representation of the stream hydraulics and flood plain area. Preliminary locations for the cross sections were made by stereoscopic examination of aerial photographs. The final locations were selected in the field. Cross-section rating curves were computed from field survey data by solving water surface profiles for various discharges. The water surface profiles were computed by the use of Paul Doubt's IBM-650 Computer Program.

Valley sections on other tributaries, excluding Fourche Maline and Poteau River of Arkansas, were located and surveyed using assumed elevations in sufficient number to obtain necessary data. Rating curves for these valley sections were developed by the slope area method.

Unit hydrographs were developed for incremental areas of each watershed in the Basin. The formula $tp = 1.48\ (LLca)^{0.4}/s^{0.5}$ developed from the analysis of data from stream gages on Six Mile Creek in Arkansas by the E&WP Unit at Fort Worth, Texas, was used to determine the time to peak of the unit hydrograph for the various segments of the watersheds. This time to peak was then adjusted to bring all hydrographs to a 2-hour unit hydrograph.

The formula $q = \frac{484A}{tp}$ (National Engineering Handbook, Section 4, Hydrology, Supplement A) was used to compute the peak of the unit hydrographs. Unit hydrographs were then developed, using the computed peak discharge and the dimensionless unit hydrograph (Figure 3.16-3, NEH-4 Supplement A) for each segment of the watershed.

The coefficient method of flood routing was used to establish the runoff-peak discharge relationship for the 25-, 10-, 5-, and 2-year frequency storms for the watersheds in the Basin for conditions that would exist due to:

1. The present conditions of the watershed.

2. The installation of land treatment measures for watershed protection (James Fork and Caston-Mountain creeks only).

3. The installation of land treatment measures and floodwater retarding structures.

Discharge-area inundation curves were developed for the evaluation reaches of each watershed by summation of the area flooded, by depth increments, for each cross section in the evaluation reaches.

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The emergency spillway and freeboard design storms were selected from Technical Letter Code EWP H-1 (Revised). Spillway design storm hydrographs were developed for each of the floodwater retarding structures by the distribution graph method. The combination of emergency spillway width, depth, and elevation for the most economical structure was estimated by an empirical equation.

Unit hydrographs for present and with upstream structures in place on the tributaries of the Poteau River were furnished to the Corps of Engineers to assist in determining the effect of the upstream flood control program on the main stem of the Poteau River.

Sedimentation Investigations

The field studies of sedimentation problems in the Basin included reconnaissance surveys of geology and physiography, studies of overbank sediment deposits, flood plain scour, streambank erosion, and the nature of the channels near valley cross sections. Borings were made along or near representative valley sections. Damage categories were based upon depth and texture of sediment in case of deposits and upon the amount of soil removal where scour occurred. Loss of productivity was determined by interviews with farmers, ranchers, and Soil Conservation Service personnel.

In the preparation of the report, tabular summaries of all the studies were prepared. The Basin Staff Economist used these in calculating monetary damages.

Sedimentation and geological investigations were made in accordance with all applicable State, E&WP Unit, and National Memoranda, and Technical Releases.

Sediment source studies were made in detail on a number of sites throughout the Basin. Erosion rates were calculated for each soil unit, slope, and cover conditions in the drainage area. Included in the studies were percent and length of slope, basic erosion rate of the soil, land use and cover condition, rainfall amounts and intensities, and conservation measures on the land. The following tabulation further explains the detailed investigations made within the Basin.

Watershed	No. of Sites Investigated	Total Acres in Sites	Total Area Above Sites (Acres)	Percent of Area Detailed
Caston-Mountain	2	10,272	29,645	35
Black Fork	1	4,384	70,294	6
Combined	1	4,339	62,349	7
James Fork	3	18,033	93,338	19
Brazil	2	8,201	43,566	19

Sediment derived from roads, gullies, and streambank erosion was estimated from field studies. Results of these investigations, together with sediment source studies on already planned Public Law 566 Fourche Maline and Poteau River watersheds, were used to estimate present and future sediment yields to all the remaining multipurpose and floodwater retarding structure sites.

The total annual volume of sediment to be deposited in all of the Public Law 566 feasible sites in the Basin was calculated to be about 132.2 acre-feet from sheet erosion, 24.5 acre-feet from road and gully erosion, and 24.1 acre-feet from streambank erosion. The principal source of sediment is sheet erosion on steep sloped pasture-woodland and on formally cultivated land. Factors affecting future sediment yields such as the occasional destruction of cover by fire, deterioration due to drought, and possible changes in land use were considered in calculating sediment storage for all the sites in the Basin. The following tabulation indicates annual sediment storage by the contributing source to the watersheds:

	Annual Sediment Storage		
Watershed	Sheet Erosion Acre-Feet	Gully & Road Acre-Feet	Streambank Acre-Feet
Caston-Mountain	17.4	1.4	1.0
Black Fork	16.6	4.4	3.0
Combined	21.6	4.6	3.3
James Fork	47.6	11.2	13.4
Brazil	29.0	2.5	3.8

A volume weight of 85 pounds per cubic foot was used for all soils in place for all watersheds except Black Fork, in which 95 pounds per cubic foot were used. A volume weight of 65 pounds per cubic foot was used for submerged sediment in all watersheds except Black Fork, in which 80 pounds per cubic foot were used. All floodwater retarding structures were planned for 100-year sediment storage with the risers at the 50-year elevation. The multipurpose structures were planned for 100-year sediment storage with the sediment all being storage below the riser.

Geologic Investigations

Preliminary geologic investigations were made at all the Basin planned potential Public Law 566 sites. A semi-detailed investigation was made on site 4, Caston-Mountain, and on sites 2 and 6, James Fork Creek. The preliminary investigations consisted of a study of the geological formations and conditions that would physically affect the location and construction of the structures. Observations were made as to the kinds of rocks, faulting and folding, general attitude of bedding, condition of abutments, location of emergency spillway, ground water table, and description, amounts, and locations of borrow material.

The semi-detailed investigation involved the use of a Failing 1500 Rig and dozer on site 4, Caston-Mountain. This investigation was made on a multi-purpose site where a suspected fault crossed the foundation area and the location of borrow material would affect the cost of the site. The investigations on sites 2 and 6, James Fork Creek, were made to determine the amount of rock excavation and to locate adequate borrow material.

The following chart indicates potential Public Law 566 site locations by watersheds and geological formations:

GEOLOGIC FORMATIONS

Watershed	Site Numbers				
	Atoka	Hartshorne	McAlester	Savanna	Boggy Formation
Black Fork	1, 2, 3, 4, & 5				Bluejacket Member
Combined			1, 2, 3, 4, 5, & 7	6 & 9	
James Fork	6, 7, 8, 9, 10, 13, & 17	5, 6, 9, 13, & 16	1, 2, 3, 4, 5, 11, 12, 14, & 15		
Brazil		1	3, 4, & 5	2	
Caston-Mountain					2, 4, & 5 / 1 & 3

Geologic problems related to construction were used by the Basin Staff Engineers in arriving at estimated construction costs. All the geologic conditions on each site are described on forms SCS-375, Preliminary Geologic Investigation on Dam Sites. These are on file as a part of Basin plan substantiating data.

Economic Investigations

Determination of Agricultural Damages - The Basin was divided into eleven study areas by watersheds. Damage schedules were taken at Public Law 566 work plan development intensity on Caston-Mountain Creek and James Fork Creek watersheds. On the remaining watersheds some damage schedules were taken and local residents interviewed as to prior land use and damages sustained from flooding. The damage schedules obtained covered land use and crop distribution, yield data and historical information on flooding and flood damage. Analysis of the information contained in the schedules and supplemental data from other similar watersheds and that from the Public Law 566 plans on Poteau River and Fourche Maline Creek formed the basis for determining crop damage rates for depth and season of flooding.

The damageable values for each of the reaches in the different watersheds were based on the projected land use and yields of the different crops. The basis for these projections was from the analysis of historical data

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from the crops reporting service, conservation needs inventory and damage schedules. Productivity of the soils present in the flood plains and the profitability of growing the different crops and their future need were considered in making these projections.

The average annual damages were obtained by applying the applicable rates of damages to the floods in the synthetic frequency series.

The monetary value of the physical damages to the flood plain from scour and from deposition of sediment was based on the value of the production lost, taking into account the lag in recovery of productivity and/or the cost of farm operations to speed recovery. Damages to other agricultural property such as fences, livestock, and farm equipment were estimated by analysis of schedules, existing Public Law 566 plans in the Basin, using prevailing costs, correlated with sizes of floods.

The indirect damages calculated are those primarily affected by disruption of travel to markets, delay in marketing and extra travel time and expense to market. Information concerning this type of damage was obtained from local residents. Based on these data and information previously analyzed for watersheds, it was determined that ten percent of the direct damage would be an equitable estimate for indirect damages.

Areas that will be inundated by the sediment and detention pools of floodwater retarding structures were excluded from the damage appraisal. Production lost in these areas after installation of the project was compared with the appraised value of the sites. In this analysis, it was considered that there would be no production in the sediment pools. The land covered by the detention pools was assumed to be converted to grassland under project conditions. Since the value of the easement exceeded the value of production lost, the easement value was used in project justification.

Determination of Nonagricultural Damages - Urban damages were estimated by analysis of schedules obtained from residents of the areas that sustain damages and information obtained from the Corps of Engineers. The information was collected by the Corps of Engineers for their small project evaluation for some of the towns in the Basin.

Damage information to roads and bridges was obtained from county officials and from residents of the watersheds and was correlated with sizes of floods. Damage information to railroads was obtained from railroad officials and local residents. This information was correlated with the different sizes of floods.

Determination of Benefits - Average annual damages within each of the watersheds were calculated for conditions without a project, with land treatment, and after installation of the completed project.

The difference between the damages after the installation of a phase of the project and those before installation constituted the benefits from reduction of damages creditable to that phase. Analysis of the available data from damage schedules, previous Public Law 566 plan in the Basin, and reduction in depth and frequency of flooding provided the basis for

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estimating the benefits from restoration of lands to their former use. The benefits from restoration of former productivity were included with benefits from reduction of crop and pasture damage.

Allocation of Main Stem Benefits - Agreements were reached with the Corps of Engineers on the procedure used to allocate benefits on the main stem. The projects of each department were grouped into the following phases:

1. Channel improvement main stem.

2. U.S.D.A. projects downstream from Wister and Brazil Reservoirs.

3. Wister Reservoir Modification.

4. Brazil Reservoir.

Each phase of the system was routed as the "first in the system" and benefits determined from that phase operating alone. Routings were then made with all systems operating and the benefits produced were allocated to each phase.

Recreation Benefits - Benefits from recreation were based on the value of a visitor-day of use and the estimated number of days of use annually. The value per visitor-day of use was estimated by the kind and amount of facilities that would be planned. It was assumed that basic facilities would be planned on all sites with a potential for recreational use. A value of $1.50 per visitor-day was assigned to all developments except for smallmouthed bass fishing on Black Fork Creek. The following factors were taken into consideration in determining the number of annual visitor-days:

1. The area available for use.

2. The assumption facilities would be available.

3. The number of visitors to existing facilities.

4. The natural beauty of the area.

5. Competitive and complimentary features of other developments in the Basin.

6. Accessibility of sites.

7. Service facilities in the Basin.

8. Capacity for sustained use.

9. The opportunity for different types of recreation by seasons.

10. The projected population of the area.

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Redevelopment - Project installation will provide opportunities for employment of local labor presently unemployed or underemployed. Data for similar projects indicate that local labor costs in the area approximate 14 percent of installation costs. This value for the structures was amortized and converted to a redevelopment benefit. Likewise, the value of local labor employed in project operation and maintenance over a 20-year period was converted to an average value for the project life and used as a second redevelopment benefit.

Secondary Benefits - Secondary benefits, the net increase in the value of goods and services generated by the project, will be realized by workers, processors, and business establishments in the trade area. The evaluation of these benefits was limited to those which will occur locally as a result of the project installation.

Local secondary benefits were estimated to equal 10 percent of the other primary benefits, with the exception of those resulting from reduction of indirect damage, plus 10 percent of the increased production expense resulting from more intensive flood plain land use.

Costs - Installation costs were amortized over a 100-year period at 3 1/8 percent. Operation and maintenance costs were based on information from similar watersheds where the structures have been in operation for several years. The operation and maintenance costs were adjusted to long-term prices using the index projected by USDA, ARS-AMS dated September 1957.

Methods and Procedures - Details of the procedures used in the investigation are described in the Economics Guide for Watershed Protection and Flood Prevention (Procedures for Use with the Synthetic Frequency Approach).

Forestry Investigations

Field surveys were made on four watersheds in the Basin to determine forest conditions. Systematic sampling of these watersheds gave forest and hydrologic conditions and needed treatments. These data were expanded to the Basin.

Information from State forestry officials, the Supervisor of the Ouachita National Forest, the Conservation Needs Inventory, and past surveys fixed the amount of remedial measures recommended for installation by 1980 as well as measures installed to date.

The U.S. Forest Service contracted with a consulting forest economist to develop the forest statistical and economic data for the Basin. His report (Forests and Forest Use in the Poteau River Basin, William S. Stover, Dec. 4, 1964) is on file as a part of Basin plan substantiating data.

PROPOSED PROJECTS

Structural Measures

The upstream structural measures included in the Basin Report fall into two categories (1) those that are economically justified under existing criteria and (2) those that are needed for long-range development of the resources of the Basin. The measures considered were single-purpose structures for flood prevention and multipurpose sites for flood prevention and one or more of the following purposes: municipal, recreation, and fish and wildlife. The upstream structural measures provide permanent storage for fish and wildlife, recreation, and municipal purposes; and temporary storage of runoff for flood prevention in the tributary watersheds.

The following data were prepared for the sites which were found to be economically feasible: (1) preliminary designs, (2) structural data tabulations, and (3) cost estimates are included under cost of programs. Cost and benefits comparisons are included in Section VI of the report. The feasible sites are shown on the Projects Map as numbered structures, and the sites that are needed for long-range Basin development are designated with letters, plate 7, following page 84, of the report.

The following table shows the number of sites studied, the number found to be feasible, and the number needed for long-range Basin development.

Table A 11 - Feasibility Classification of Sites
Poteau River Basin, in Oklahoma and Arkansas

Watershed	No. of Sites Studied	No. of Sites Feasible	No. of Sites for Long-range Basin Development
1. Poteau River	4 1/	-	4
2. Black Fork	22	5	4
3. Holston-Reichert	7	-	3
4. Fourche Maline	5 1/	-	3
5. Caston-Mountain	8 1/	-	-
6. Combined	12	9	1
7. James Fork	28	17	-
8. Brazil	17	5 2/	1
9. Poteau & Heavener Laterals	8	-	6
10. Spiro & Bonanza Laterals	9	-	3
Total	120	36	25

1/ Sites in addition to those included in watershed work plans. (These work plans include 38 structures.)

2/ Operating with Corps of Engineers (Brazil Reservoir).

Flood Control Structures - The first consideration in the selection and location of structure sites was for the protection of the flood plain lands and the protection of agricultural and urban property. The level of protection needed which cannot be met by land treatment alone, also influences the location of sites. Other considerations were the needs for multipurpose storage for beneficial uses and to augment the flow of some of the streams in the Basin. The final determination for the number and location of the sites was made from an economic analysis of the cost and benefits. The following table lists the pertinent data for these watersheds.

Table A12 - Tributary Watershed Data
Poteau River Basin, in Oklahoma and Arkansas

Tributary Watershed	Number of Structures	Acreage Draining Through Structures	Percent Watershed Control
Poteau River 1/	19	75,117	40.0
Black Fork	5	70,298	52.7
Fourche Maline 1/	14	72,602	41.4
Caston-Mountain 1/	5	29,645	62.0
Combined	9	62,349	52.7
James Fork	17	92,755	66.7
Brazil	5	37,011	24.3
Total	74	439,777	xx

1/ Public Law 566 work plan developed.

Project Design Criteria - The preliminary design of the structures needed within the next 10 to 15 years for Basin development was based on Public Law 566 planning criteria. The procedures used in making the studies and in developing tentative plans and designs for the major structural improvements are:

1. Structure classification was determined for all structures included in the Basin plan.

2. Detention storage was determined for capacity needed for a 25-, 50-, or a 100-year storm event, depending on the classification of the structures. Detention capacities up to 12,500 acre-feet were considered in planning the structures.

3. Sediment storage was determined from investigations made for the volume of sediment expected over a 100-year evaluation period for the structures.

4. Water supply storage was based on the foreseeable needs for municipal and industrial, fish and wildlife, and recreational uses. There were evidences of favorable local interest and support for all the projects planned.

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Cost Estimates - Procedures used in planning Public Law 566 projects also were used as guidelines in estimating the cost of the upstream projects. Cost allocation was made for all multipurpose structures. The Use of Facilities Method was used to allocate joint cost between purposes. Cost sharing was estimated on the following basis: Federal sources would provide funds for construction and installation services cost allocated to flood prevention; and one-half of the construction cost and all of the installation services cost allocated either to recreation or fish and wildlife. Local interest would provide funds for one-half of the construction cost allocated to recreation or fish and wildlife, all the cost allocated to municipal storage, and cost of the land rights for all purposes. The provision for Federal cost-sharing of land rights, which includes land in the reservoir needed for recreational purposes, the adjacent land area for recreational facilities, and for access roads, was not included in the estimates.

USDA Project Possibilities

Individual watersheds with projects needed during the next 10 to 15 years which would be feasible under Public Law 566 criteria are as follows:

1. Black Fork Creek.
2. Combined Creeks.
3. James Fork Creek.
4. Brazil Creek.

Black Fork Creek Watershed - The location of the watershed and the proposed structures are shown on the Projects Map, plate 7, following page 84.

Description

The watershed covers an area of 133,414 acres in LeFlore County, Oklahoma, and Scott and Polk counties, Arkansas. The principal tributaries of Black Fork Creek are Cedar, Shawnee, Big, and Haws creeks. Flood plain lands along these streams amount to 5,872 acres. At present, the land use in the watershed is 5,570 acres in cropland, 11,020 acres in pasture and rangeland, 114,124 acres in forest and woodland, and 2,700 acres in miscellaneous use. Included in the watershed area are 74,377 acres in the Ouachita National Forest, administered by the U.S. Forest Service. There are also 16,000 acres of Federally owned land in the Wister Reservoir area.

Land Treatment and Structural Measures

Land treatment measures have been established in recent years by owners and operators in the watershed at an estimated cost of $340,300. Land treatment needed in the next 10 to 15 years includes treatment on 2,660 acres of cropland, 10,100 acres of pasture and rangeland, 9,000 acres of forest and woodland, and 5,950 acres for wildlife and recreational areas. The estimated cost for the application of these measures is $975,600.

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The upstream structural measures needed in this watershed consist of two floodwater retarding structures, three multipurpose structures, and a recreational development along 22.5 miles of stream channels. These structures will provide 2,900 acre-feet of capacity for sediment storage, 13,652 acre-feet of storage for fish and wildlife, and 34,758 acre-feet of floodwater detention storage, and for all purposes, an aggregate capacity of 51,310 acre-feet.

The combined drainage area of the structures is 70,298 acres, which is 53 percent of the total area of the watershed. The estimated cost of the structural measures is $2,446,700.

Fish and Wildlife Storage

The Black Fork Creek watershed has some of the most spectacular scenery found in this locality with its clear flowing streams winding through peaceful valleys among pine-covered hills and mountains. Much of the upland portion of the watershed is in the Ouachita National Forest, and the land along the streams in the valleys is generally in private ownership. As an indication of the scenery and the natural beauty of the area, Talimena Drive, a $7,000,000 scenic highway, is presently under construction in this area. The Drive is being built under the supervision of the U.S. Forest Service, and a major section is along the southern border of Black Fork Creek watershed.

One of the chief problems in the area is that the crystal clear streams in the area cease to flow during the summer months and during extreme drought conditions. Many of the smaller streams completely dry up, and all the streams are reduced to water holes connected with sections of dry streambeds during these periods. This condition has a serious effect on fishing and on fish production in these streams. Paradoxically, this occurs during the height of the tourist season.

The multiuse concept of both the water and related land resources was recognized in developing the coordinated Basin plan by adding fish and wildlife storage to the flood control structures to form lakes that will blend in and add beauty to the landscape. With the release of cool clear water to make free-flowing, year-round streams and with scenic roads and trails to furnish access, this area would be unexcelled in natural beauty. Final planning and implementation would require the following:

1. Impounding fish and wildlife storage to augment streamflows of at least 10 c.f.s. each in Haws, Big, and Black Fork creeks.

2. Supervision from both Oklahoma and Arkansas Fish and Wildlife departments in operating the reservoirs and the free-flowing streams.

3. To provide for public acquisition of lands needed for the developments.

4. Maintaining natural beauty where it exists and restoring beauty where it has been marred along these streams.

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5. Improved fish habitat will result in a need for additional numbers of native species and/or the introduction of new species, i.e., smallmouthed bass.

Effects and Feasibility

The proposed improvements would reduce flood damages and provide recreational opportunities in the watershed. There would be an increase in farm incomes resulting from restoration of former productivity and reduction in floodwater damages. This would improve living conditions of owners and operators of benefited lands and of residents of the area. The crop production on the flood plain will be used for livestock production in the Poteau Basin.

Land treatment measures will improve cover conditions on woodland and open land resulting in reduced storm runoff and erosion. Corresponding reductions in flood damages in the bottomlands will be accomplished. Application of land treatment practices will increase forage production and allow heavier stocking rates and reduce supplemental feed cost. This will provide better net incomes for watershed residents, thereby raising living standards.

Proposed structures affecting National Forest lands in the Black Fork Creek watershed generally are acceptable and compatible with National Forest programs. Minor conflicts with transportation systems and other activities will be negotiated, and mitigating measures agreed to, following authorization for planning under Public Law 566.

Storage of water for fish and wildlife purposes will be provided in multipurpose sites 3, 4, and 5 of the Black Fork Creek watershed. Sufficient water will be released from these sites to sustain a flow of at least 10 c.f.s. in Black Fork, Haws, and Big creeks. In the main stem channel below the confluence of these creeks, the minimum rate of flow will be approximately 30 c.f.s. There will be an average of 500 man-days of smallmouthed bass fishing for each mile of stream channel affected. The 40 miles of stream channel below sites will provide 20,000 man-days of fishing per year. The smallmouthed bass fishing is valued at $2.00 per fisherman-day because of the limited amount available within the state.

The added storage in the three multipurpose sites also will provide on-site recreational benefits. Site 4 will offer all types of recreation; sites 3 and 5 will be more limited because of the smaller water surfaces. The average annual use of the three sites will be 21,720 visitor-days valued at $1.50 per visitor-day. In the estimation of average annual visitor-days for each site, an adjustment was made for the effect deficient water supply would have on full use during periods when water was being released to sustain the minimum flow in the channel.

Total estimated annual recreational benefits for the watershed are $72,580.

Secondary benefits stemming from the project will accrue to the trade area through increased income from sales and services resulting from increased production after project installation. Benefits induced by the project will

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result from expenditures associated with the increased cost of production of the additional commodities. These benefits amount to $5,164 annually.

Redevelopment benefits are computed for labor cost during construction, operation, and maintenance for a 20-year period. These amount to $6,309 annually.

Annual damage reduction benefits amount to $46,330.

Comparison of Benefits and Cost

The average annual cost of structural measures including operation and maintenance is $108,354. Total benefits amounting to $130,383 from structural measures will provide a benefit-cost ratio of 1.2:1.

The estimated costs of the proposed structures are shown in table A13. Cost allocation is shown in table A14. Structural data are shown in table A20.

Combined Creeks - The location of the watershed and the proposed structures are shown on the Projects Map, plate 7, following page 84.

Description

The watershed covers an area of 118,272 acres in LeFlore County, Oklahoma, and Sebastian County, Arkansas. The tributary streams are Morris, Sugarloaf, Nail, Gap, and Riddle creeks. Flood plain lands along these streams amount to 3,205 acres. At present the land use in the watershed is 10,100 acres in cropland, 18,515 acres in pasture and rangeland, 86,517 acres in forest and woodland, and 3,140 acres in miscellaneous use. There are only 3,380 acres of the watershed area in the Ouachita National Forest.

Land Treatment and Structural Measures

Land treatment has been established in recent years by owners and operators in the watershed at an estimated cost of $412,600. Land treatment needed in the next 10 to 15 years includes treatment on 4,635 acres of cropland, 20,300 acres of pasture and rangeland, 18,000 acres of forest and woodland, and 3,000 acres for wildlife and recreational areas. The estimated cost for the application of these measures is $1,302,100.

The upstream structural measures needed in this watershed consist of six floodwater and three multipurpose structures. These structures will provide 3,239 acre-feet of capacity for sediment storage, 1,002 acre-feet of storage for recreation, 1,000 acre-feet of storage for municipal water supply, 34,979 acre-feet of floodwater detention storage, and for all purposes, an aggregate capacity of 40,220 acre-feet. The combined drainage area of the structures is 62,349 acres, which is 53 percent of the total area of the watershed. The estimated cost of the structural measures is $2,688,600.

Table A13 - Estimated Structural Cost Distribution
Black Fork Creek Watershed
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Site Number	Construction	Installation	Easements	Total
1	288,800	43,300	23,000	355,100
2	121,600	26,800	8,000	156,400
3	600,000	90,000	49,500	739,500
4	373,900	56,000	105,800	535,700
5	330,500	49,500	55,000	435,000
Subtotal	1,714,800	265,600	241,300	2,221,700
Fish & Wildlife Facilities	123,000	12,000	90,000	225,000
Total	1,837,800	277,600	331,300	2,446,700

Table A14 - Cost Allocation
Black Fork Creek Watershed
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Site Number	Flood Prevention	Fish & Wildlife	Total
1	355,100	-	355,100
2	156,400	-	156,400
3	488,200	251,300	739,500
4	343,300	192,400	535,700
5	290,600	144,400	435,000
Fish & Wildlife Facilities	-	225,000	225,000
Total	1,633,600	813,100	2,446,700

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Recreational and Municipal Storage

The need for water-based recreational opportunities to be developed in the watershed was recognized in planning. To meet the increasing demand for recreation in this area a multipurpose structure located on Gap Creek and another on Sugarloaf Creek will provide storage for this purpose. The size of the recreational pools will be 160 and 110 acres in surface. The structures including recreational storage are shown in the Appendix table A21, page 154. These sites are in scenic surroundings in which natural conditions can be used to develop outdoor recreational areas. Minimum basic facilities are to be installed in suitable areas adjacent to the reservoirs to provide public recreational use.

A municipal water supply is needed for Howe, Oklahoma. Storage for this purpose was included in a structure site near the town.

Effects and Feasibility

The combined program of land treatment and structural measures would reduce flood damages and provide recreational opportunities in the watershed. Owners of 3,205 acres of agricultural flood plain land would be directly benefited by the project, but all residents of the watershed and surrounding area would be indirectly benefited. The reduced frequency and depth of flooding would make it possible for farmers to organize more efficient operations.

Increased farm production from the project would provide farm families with additional income. In turn, this would be distributed through the community in the form of additional purchases to maintain a higher standard of living, to employ additional labor, and to increase demand for more services. Facilities for marketing and processing this increased farm production would be expanded or utilized more fully.

Land treatment measures would improve cover conditions on woodlands and open land resulting in reduced storm runoff and erosion. Forage production would be increased allowing heavier stocking rates and reducing supplemental feeding costs.

Recreational water stored in sites 2 and 4 would provide excellent opportunities for recreation for the residents of the watershed and surrounding area. Facilities planned should permit full use of the developments. The water-based recreational developments should induce some of the tourists traveling in the area to remain longer. The additional money spent by tourists for food and lodging would help the local economy, and most of the money spent for water-based recreation by the residents would remain in the local trade area. Estimated average annual use of the developments would be: Site 2, 10,250 people; Site 4, 7,100 people. Each visitor-day was valued at $1.50. Total estimated recreational benefits for the two sites are $26,025.

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The project would create additional employment opportunities for the local residents. The firms contracting for installation of the structures would hire a large percentage of the skilled and unskilled labor from the immediate locality. The operation and maintenance of project measures over the life of the project also would provide employment opportunities for the local residents. Redevelopment benefits are computed from labor costs during construction and from operation and maintenance costs for a 20-year period. These amount to $7,296 annually.

In the Combined Creeks watershed average annual damage would be reduced from $28,605 to $3,117 on the flood plain below floodwater retarding structures. This is a total reduction of $25,488, or 89 percent. Land treatment and structural measures in the Combined Creeks watershed also would reduce average annual floodwater damage on the main stem of Poteau River by $73,292.

Secondary benefits stemming from the project would accrue to the trade area through increased income from sales and services resulting from increased production after project installation. Benefits induced by the project would result from expenditures associated with the increased cost of production of the additional commodities. These benefits amount to $2,129 annually.

Comparison of Benefits and Costs

The average annual cost of structural measures, including operation and maintenance, is $105,678. Total benefits amounting to $132,956 from structural measures would provide a benefit-cost ratio of 1.3:1.

Cost estimates and cost allocation are shown in tables A15 and A16. Structural data are shown in table A21.

James Fork Creek Watershed - The location of the watershed and the proposed structures are shown on the Projects Map, plate 7, following page 84.

Description

The watershed covers an area of 138,975 acres in Sebastian County, Arkansas, and LeFlore County, Oklahoma. The principal tributaries of James Fork Creek are Cedar, Cherokee, Prairie, and Hackett creeks. Flood plain lands along these streams amount to 7,308 acres. At present the land use in the watershed is 19,700 acres in cropland, 23,625 acres in pasture and rangeland, 88,775 acres in forest and woodland, and 6,875 acres in miscellaneous use. Included in the watershed area are 6,618 acres in the Ouachita National Forest, administered by the U.S. Forest Service.

Land Treatment and Structural Measures

Land treatment measures have been established in recent years by owners and operators in the watershed at an estimated cost of $841,100. Land treatment needed in the next 10 to 15 years includes treatment on 4,230 acres of cropland, 16,800 acres of pasture and rangeland, 10,000 acres of forest and woodland, and 7,700 acres of wildlife and recreational areas. The estimated cost for the application of these measures is $1,356,500.

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Table A15 - Estimated Structural Cost Distribution
Combined Creeks Watershed
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Site Number	Construction	Installation	Easements	Total
1	188,500	33,000	40,600	262,100
2	215,200	37,600	49,500	302,300
3	210,000	36,700	9,500	256,200
4	351,500	52,700	45,800	450,000
5	104,000	22,900	19,000	145,900
6	298,500	44,800	13,800	357,100
7	72,800	19,300	8,500	100,600
8	88,000	19,400	25,000	132,400
9	480,000	72,000	15,000	567,000
Subtotal	2,008,500	338,400	226,700	2,573,600
Recreation Facilities	69,000	7,000	39,000	115,000
Total	2,077,500	345,400	265,700	2,688,600

Table A16 - Cost Allocation
Combined Creeks Watershed
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Site Number	Flood Prevention	Recreation	Municipal	Total
1	262,100	-	-	262,100
2	275,500	26,800	-	302,300
3	256,200	-	-	256,200
4	420,400	29,600	-	450,000
5	145,900	-	-	145,900
6	357,100	-	-	357,100
7	100,600	-	-	100,600
8	73,900	-	58,500	132,400
9	567,000	-	-	567,000
Recreation Facilities	-	115,000	-	115,000
Total	2,458,700	171,400	58,500	2,688,600

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The upstream structural measures needed in this watershed consist of five floodwater retarding structures and 12 multipurpose structures. These structures will provide 7,108 acre-feet of capacity for sediment storage, 2,905 acre-feet of storage for recreation, 7,015 acre-feet of storage for municipal water supply, 50,508 acre-feet of floodwater detention, and for all purposes, an aggregate capacity of 67,536 acre-feet. The combined drainage area of the structures is 92,755 acres, which is 67 percent of the total area of the watershed. The estimated cost of the structural measures is $3,597,300.

Recreational and Municipal Storage

The development of the recreational resources in the James Fork Creek watershed was one of the planning objectives. Much of the demand for water-based outdoor recreation will be for the people living in or near this area. The recreational activities will include swimming, fishing, canoeing, boating, water skiing, hunting, and skindiving. Other uses in the areas near the water will be picnicking, camping, hiking, or sightseeing. The need for water-oriented recreation is expected to expand materially in the next 10 to 15 years, and more and more people will be competing for the privilege of using these water areas.

Most of the structure sites in the watershed are located within 20 miles of Fort Smith, Arkansas. Twelve of the 17 structures needed for flood prevention are for multiple uses. Six of the sites provide storage for flood prevention and recreation, 5 sites include flood prevention and municipal water supply, and one site will contain storage for flood prevention, recreation, and municipal water supply.

The structures including storage for recreational uses are shown in table A21 Appendix, page 154. The surface area of the lakes range in size from 70 to 195 acres. Recreational areas are being planned adjacent to the reservoirs with access roads. Minimum basic facilities are to be included for public recreational use. These facilities may include boat docks and ramps, beach development, picnic tables and fire places, sanitary facilities, public water supply, power facilities, roads and trails, parking lots, and similar or related facilities needed for public health, safety, access to, and use of the recreational areas.

Municipal water supplies are badly needed for Hackett, Midland, Hartford, Huntington, and Mansfield, Arkansas. Storage to furnish a water supply in the structures best suited for this purpose and nearest to the towns was included. A site was planned near Cameron, Oklahoma, to include a water supply and a recreational development for the community.

Effects and Feasibility

The combined program of land treatment and structural measures would reduce flood damages and provide recreational opportunities in the watershed. Owners of 7,308 acres of agricultural flood plain land would be directly benefited by the project, but all residents of the watershed and surrounding

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area would be indirectly benefited. The reduced frequency and depth of flooding would make it possible for farmers to organize more efficient operations.

Increased farm production from the project would provide farm families with additional income. In turn, this would be distributed through the community in the form of additional purchases to maintain a higher standard of living, to employ additional labor, and to increase demand for more services. Facilities for marketing and processing this increased farm production would be expanded or utilized more fully.

Land treatment measures would improve cover conditions on woodlands and open land resulting in reduced storm runoff and erosion. Forage production would be increased allowing heavier stocking rates and reducing supplemental feeding costs.

Recreational water stored in sites 3, 6, 9, 10, 11, and 12 would provide excellent opportunities for recreation for the residents of the watershed and surrounding area and for tourists traveling in the area. Facilities planned should permit full use of the developments. The water-based recreational developments should induce some of the tourists to remain in the area longer. The additional money spent by the tourists for food and lodging would help the local economy, and most of the money spent for water-based recreation by the residents would remain in the local trade area. Estimated average annual use of the developments would be 38,200 people. Each visitor-day is valued at $1.50. Total estimated recreational benefits for the six sites is $57,300.

The project would create additional employment opportunities for the local residents. The firms contracting for the installation of the structures would hire a large percentage of the skilled and unskilled labor from the immediate locality. The operation and maintenance of project measures over the life of the project also would provide employment opportunities for the local residents. Redevelopment benefits are computed from labor cost during construction and from operation and maintenance costs for a 20-year period. These amount to $2,286 annually.

In the James Fork Creek watershed, average annual damages would be reduced from $106,251 to $19,947 on the flood plain below floodwater retarding structures. This is a total reduction of $86,304, or 81 percent. Land treatment and structural measures in the watershed also would reduce average annual floodwater damage on the main stem of the Poteau River by $54,029.

Secondary benefits stemming from the project would accrue to the trade area through increased income from sales and services resulting from increased production after project installation. Benefits induced by the project would result from expenditures associated with the increased cost of production of the additional commodities. These benefits amount to $7,923 annually.

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Comparison of Benefits and Costs

The average annual cost of structural measures, including operation and maintenance, is $137,333. Total benefits amounting to $201,504 from structural measures would provide a benefit-cost ratio of 1.5:1.

Table A17 - Estimated Structure Cost Distribution
James Fork Creek Watershed
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Site Number	Construction	Installation	Easements	Total
1	52,500	13,900	8,800	75,200
2	158,400	27,700	33,000	219,100
3	89,600	19,700	19,500	128,800
4	75,100	16,500	24,000	115,600
5	309,600	46,400	100,000	456,000
6	67,100	17,500	38,000	122,600
7	197,600	34,600	60,000	292,200
8	39,000	10,300	32,300	81,600
9	68,000	18,000	65,000	151,000
10	185,600	32,400	35,000	253,000
11	145,600	32,000	24,400	202,000
12	105,600	23,200	19,200	148,000
13	146,700	32,300	28,000	207,000
14	123,800	27,200	19,200	170,200
15	32,800	8,700	14,700	56,200
16	33,600	8,900	16,300	58,800
17	32,300	8,600	9,100	50,000
Subtotal	1,862,900	377,900	546,500	2,787,300
Recreation Facilities	153,600	15,400	85,000	254,000
Total	2,016,500	393,300	631,500	3,041,300

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The following table shows the allocation of estimated cost. Structural data are shown in table A22.

Table A18 - Cost Allocation
James Fork Creek Watershed
Poteau River Basin, in Oklahoma and Arkansas

Site Number	Flood Prevention	Recreation	Municipal	Total
		(Dollars)		
1	75,200	-	-	75,200
2	153,900	20,500	44,700	219,100
3	104,500	24,300	-	128,800
4	92,100	-	23,500	115,600
5	361,300	-	94,700	456,000
6	112,300	10,300	-	122,600
7	232,100	-	60,100	292,200
8	54,500	-	27,100	81,600
9	129,700	21,300	-	151,000
10	223,900	29,100	-	253,000
11	181,400	20,600	-	202,000
12	119,800	28,200	-	148,000
13	151,600	-	55,400	207,000
14	170,200	-	-	170,200
15	56,200	-	-	56,200
16	58,800	-	-	58,800
17	50,000	-	-	50,000
Recreation Facilities		254,000	-	254,000
Total	2,327,500	408,300	305,500	3,041,300

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Brazil Creek Watershed - The location of the watershed and the proposed structures are shown on the Projects Map, plate 7, following page 84.

Description

The watershed covers an area of 152,100 acres in LeFlore, Latimer, and Haskell counties, Oklahoma. The principal tributaries of Brazil Creek are Wildhorse, Owl, and Buck creeks. Flood plain lands along these streams which will be protected by upstream structural measures amount to 3,352 acres. At present, the land use in the watershed is 18,620 acres in cropland, 30,990 acres in pasture and rangeland, 97,490 acres in forest and woodland, and 5,000 acres in miscellaneous use.

Land Treatment and Structural Measures

Land treatment measures have been established in recent years by owners and operators in the watershed at an estimated cost of $804,300. Land treatment needed in the next 10 to 15 years includes treatment on 3,425 acres of cropland, 31,900 acres of pasture and rangeland, 18,000 acres of forest and woodland, and 4,160 acres for wildlife and recreational areas. The estimated cost for the application of these measures is $1,802,200.

The upstream structural measures needed in this watershed consist of four floodwater retarding structures located above the Corps of Engineers Brazil Reservoir and one structure located on the Buck Creek tributary drainage below the reservoir. These structures will provide 2,463 acre-feet of capacity for sediment storage, 19,558 acre-feet of floodwater detention or a total capacity of 22,021 acre-feet. The combined drainage areas of the structures included in the Soil Conservation Service projects is 37,011 acres, which is 24 percent of the total area of the watershed. The drainage area controlled by the Soil Conservation Service structure and the Corps of Engineers Brazil Reservoir is about 85 percent. The estimated cost of the structural measures is $1,442,300.

The storage of water in these structures for other beneficial uses was not considered since the Brazil Reservoir can meet the foreseeable needs in the watershed. The sediment pools of the structures will be used for incidental recreation.

Effects and Feasibility

The combined program of land treatment and structural measures would reduce flood damages in the watershed. Owners of 3,352 acres of agricultural flood plain land would be directly benefited by the project, but all residents of the watershed and surrounding area would be indirectly benefited. The reduced frequency and depth of flooding would make it possible for farmers to organize more efficient operations.

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Increased farm production from the project would provide farm families with additional income. In turn, this would be distributed through the community in the form of additional purchases to maintain a higher standard of living, to employ additional labor, and to increase demand for more services. Facilities for marketing and processing this increased farm production would be expanded or utilized more fully.

Land treatment measures would improve cover conditions on woodlands and open land resulting in reduced storm runoff and erosion. Forage production would be increased allowing heavier stocking rates and reducing supplemental feeding costs.

The project would create additional employment opportunities for the local residents. The firms contracting for the installation of the structures would hire a large percentage of the skilled and unskilled labor from the immediate locality. The operation and maintenance of project measures over the life of the project also would provide employment opportunities for the local residents. Redevelopment benefits are computed from labor cost during construction and from operation and maintenance costs for a 20-year period. These amount to $10,715 annually.

In the Brazil Creek watershed, average annual damages would be reduced from $55,776 to $13,497 on the flood plain below floodwater retarding structures. This is a total reduction of $42,279 or 76 percent. Land treatment and structural measures in the watershed also would reduce average annual floodwater damage on the main stem of the Poteau River by $6,271.

Secondary benefits stemming from the project would accrue to the trade area through increased income from sales and services resulting from increased production after project installation. Benefits induced by the project would result from expenditures associated with the increased cost of production of the additional commodities. These benefits amount to $3,933 annually.

Comparison of Benefits and Costs

The average annual cost of structural measures, including operation and maintenance, is $48,000. Total benefits amounting to $55,645 from structural measures would provide a benefit-cost ratio of 1.2:1.

Table A19 - Estimated Structural Cost Distribution
Brazil Creek Watershed
Poteau River Basin, in Oklahoma and Arkansas
(Dollars)

Structure Number	Construction	Installation	Easements	Total
1	120,000	26,400	39,400	185,800
2	210,400	36,800	11,800	259,000
3	354,900	52,200	22,400	429,500
4	238,500	35,700	29,300	303,500
5	206,500	36,100	21,900	264,500
Total	1,130,300	187,200	124,800	1,442,300

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Table A20 - Black Fork Creek Structure Data
Poteau River Basin, in Oklahoma and Arkansas

Item	Unit	Site Numbers 1	2	3	4	5	Total
Location	Sec. T. R.	27-4N-25E	15-3N-25E	11-3N-26E	8-1N-32W	27-4N-27E	
Drainage Area	sq. mi.	17.66	6.85	37.27	28.24	19.82	109.84
Storage Capacity							
Sediment Pool	ac. ft.	207	80	755 1/	572 1/	402 1/	2,016
Sed. in WS Pool	ac. ft.	-	-	99	90	63	252
Recreation Pool	ac. ft.	-	-	5,963 2/	4,518 2/	3,171 2/	13,652
Municipal Pool	ac. ft.	-	-	-	-	-	-
Sed. in Det. Pool	ac. ft.	226	88	139	105	74	632
Detention Pool	ac. ft.	6,320	2,488	9,937	9,036	6,977	34,758
Total	ac. ft.	6,753	2,656	16,893	14,321	10,687	51,310
Surface Area							
Sediment Pool	acre	17	9	75	150	36	287
Recreation Pool	acre	-	-	310	530	246	1,086
Municipal Pool	acre	-	-	-	-	-	-
Detention Pool	acre	290	98	570	880	488	2,326
Embankment Data							
Elev. Top of Dam	m.s.l.	675	853	890	858	841	xx
Volume of Fill	1,000 c.y.	385	152	1,000	453	410	2,400
Maximum Height	feet	65	59	85	63	68	xx
Emergency Spillway							
Crest Elevation	m.s.l.	669	847	883	853	837	xx
Bottom Width	feet	130	120	240	120	160	xx
Type		veg.	veg.	veg.	veg.	veg.	xx
Percent Chance of Use		4	4	4	4	4	xx
Ave. Curve No.-Cond. II		83	83	83	83	83	xx
Principal Spillway (Cap.)	c.f.s.	265	103	559	424	297	xx
Capacity Equivalents							
Sediment Volume	inch	.46	.46	.50	.51	.51	xx
Water Supply Volume	inch	-	-	3.00	3.00	3.00	xx
Detention Volume	inch	6.71	6.81	5.00	6.00	6.60	xx
Spillway Storage	inch	2.23	2.03	1.90	3.34	2.39	xx
Class of Structure		a	a	a	a	a	xx

1/ 100-year sediment.
2/ Fish and wildlife storage.

Table A21 - Combined Creeks Structure Data
Poteau River Basin, Oklahoma and Arkansas

Item	Unit	Site Numbers 1	2	3	4	5	6	7	8	9	Total
Location	Sec. T. R.	2-7N-26E	11-7N-26E	25-7N-26E	15-6N-27E	19-6N-27E	26-6N-26E	15-6N-26E	20-6N-26E	9-5N-25E	
Drainage Area	sq.mi.	11.90	16.07	7.27	24.30	6.78	10.51	4.10	3.69	12.80	97.42
Storage Capacity											
Sediment Pool	ac.ft.	228	523 1/	143	596 1/	94	146	57	94 1/	164	2,045
Sed. in WS Pool	ac.ft.	-	94	-	65	-	-	-	14	-	173
Recreation Pool	ac.ft.	-	497	-	505	-	-	-	-	-	1,002
Municipal Pool	ac.ft.	-	-	-	-	-	-	-	1,000	-	1,000
Sed. in Det. Pool	ac.ft.	235	94	143	65	94	146	59	14	171	1,021
Detention Pool	ac.ft.	4,633	6,257	2,520	7,776	2,459	3,772	1,640	1,348	4,574	34,979
Total	ac.ft.	5,096	7,465	2,806	9,007	2,647	4,064	1,756	2,470	4,909	40,220
Surface Area											
Sediment Pool	acre	67	94	26	65	18	18	14	14	14	330
Recreation Pool	acre	-	160	-	110	-	-	-	-	-	270
Municipal Pool	acre	-	-	-	-	-	-	-	117	-	117
Detention Pool	acre	474	500	96	500	235	167	99	215	186	2,472
Embankment Data											
Elev. Top of Dam	m.s.l.	482	505	596	633	686	748	529	531	693	xx
Volume of Fill	1,000 c.y.	290	331	400	420	130	398	91	110	800	2,970
Maximum Height	feet	36	50	61	63	40	76	44	36	59	xx
Emergency Spillway											
Crest Elevation	m.s.l.	477	500	591	627	682	742	525	527	687	xx
Bottom Width	feet	350	460	80	210	40	100	250	40	65	xx
Type		veg.	veg.	veg.	veg.	veg.	veg.	veg.	veg.	veg.	xx
Percent Chance of Use		2	2	4	4	4	4	2	4	4	xx
Ave. Curve No.-Cond. II		78	78	78	78	78	78	78	78	78	xx
Principal Spillway (Cap.)	c.f.s.	119	160	73	243	68	105	41	37	128	xx
Capacity Equivalents											
Sediment Volume	inch	0.73	0.83	0.74	0.58	0.52	0.52	0.53	0.62	0.49	xx
Water Supply Volume	inch	-	0.58	-	0.39	-	-	-	5.08	-	xx
Detention Volume	inch	7.30	7.30	6.50	6.00	6.80	6.73	7.50	6.85	6.70	xx
Spillway Storage	inch	2.87	3.04	1.96	1.50	4.83	1.50	2.17	10.45	2.46	xx
Class of Structure		b	b	a	a	a	a	b	a	a	xx

1/ 100-year sediment.

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Table A22 - James Fork Creek Structure Data
Poteau River Basin, in Oklahoma and Arkansas

Item	Unit	Site Numbers 1	2	3	4	5	6	7	8	9
Location	Sec. T. R.	22-8N-26E	25-8N-26E	4-5N-32W	23-5N-32W	6-4N-31W	25-5N-31W	3-4N-31W	1-4N-31W	22-5N-31W
Drainage Area	sq.mi.	2.14	9.87	6.14	5.70	37.67	9.50	10.53	3.01	14.08
Storage Capacity										
Sediment Pool	ac.ft.	58	332 1/	252 1/	267 1/	1,286 1/	431 1/	561 1/	159 1/	533 1/
Sed. in WS Pool	ac.ft.	-	68	49	54	181	56	110	32	68
Recreation Pool	ac.ft.	-	500	501	-	-	304	-	-	503
Municipal Pool	ac.ft.	-	1,000	-	499	3,014	-	1,001	501	-
Sed. in Det. Pool	ac.ft.	58	53	26	27	261	66	55	16	83
Detention Pool	ac.ft.	744	3,370	2,112	1,961	11,552	3,699	4,454	1,637	4,753
Total	ac.ft.	860	5,323	2,940	2,808	16,294	4,556	6,181	2,345	5,940
Surface Area										
Sediment Pool	acre	9	71	40	35	168	40	76	25	100
Recreation Pool	acre	-	90	78	-	-	70	-	-	195
Municipal Pool	acre	-	155	-	83	360	-	225	135	-
Detention Pool	acre	108	285	175	233	970	435	575	295	675
Embankment Data										
Elev. Top of Dam	m.s.l.	471	504	534	589	603	597	645	641	571
Volume of Fill	1,000 c.y.	70	176	112	82	344	67	247	39	68
Maximum Height	feet	41	54	49	44	62	47	40	36	26
Emergency Spillway										
Crest Elevation	m.s.l.	467	499	529	584	597	592	639	637	566
Bottom Width	feet	40	45	45	40	210	280	150	185	40
Type		veg.	veg.	veg.	veg.	veg.	veg.	veg.	veg.	veg.
Percent Chance of Use		4	4	4	4	4	2	2	1	4
Ave. Curve No.-Cond. II		78	78	78	78	78	78	78	78	78
Principal Spillway (Cap.)	c.f.s.	21	99	61	57	377	95	105	30	140
Capacity Equivalents										
Sediment Volume	inch	1.02	0.86	1.00	1.15	0.86	1.09	1.19	1.29	0.91
Water Supply Volume	inch	-	2.85	1.53	1.64	1.50	0.60	1.64	3.12	0.67
Detention Volume	inch	6.52	6.40	6.45	6.45	5.75	7.30	7.30	10.20	6.33
Spillway Storage	inch	1.66	3.00	2.72	4.76	1.69	4.36	5.87	10.00	4.74
Class of Structure		a	a	a	a	a	b	b	c	a

1/ 100-year sediment.

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Table A22 - James Fork Creek Structure Data (Continued)
Poteau River Basin, in Oklahoma and Arkansas

Item	Unit	Site Numbers 10	11	12	13	14	15	16	17	Total
Location	Sec. T. R.	18-5N-30W	8-5N-31W	25-6N-32W	16-6N-32W	16-8N-27E	18-8N-27E	12-8N-26E	16-8N-26E	
Drainage Area	sq.mi.	12.11	7.91	3.85	6.86	6.41	3.89	3.40	1.86	144.93
Storage Capacity										
Sediment Pool	ac.ft.	439 1/	236 1/	183 1/	212 1/	109	87	60	34	5,239
Sed. in WS Pool	ac.ft.	58	34	25	40	-	-	-	-	775
Recreation Pool	ac.ft.	497	300	300	-	-	-	-	-	2,905
Municipal Pool	ac.ft.	-	-	-	1,000	-	-	-	-	7,015
Sed. in Det. Pool	ac.ft.	65	38	29	22	109	89	62	35	1,094
Detention Pool	ac.ft.	4,107	2,708	1,331	2,707	2,201	1,345	1,179	648	50,508
Total	ac.ft.	5,166	3,316	1,868	3,981	2,419	1,521	1,301	717	67,536
Surface Area										
Sediment Pool	acre	45	45	25	42	26	20	7	8	782
Recreation Pool	acre	100	75	75	-	-	-	-	-	683
Municipal Pool	acre	-	-	-	112	-	-	-	-	1,070
Detention Pool	acre	370	250	185	265	230	176	210	113	5,550
Embankment Data										
Elev. Top of Dam	m.s.l.	622	548	516	552	481	474	480	492	xx
Volume of Fill	1,000 c.y.	232	182	132	163	165	41	42	38	2,200
Maximum Height	feet	35	38	24	40	36	27	25	23	xx
Emergency Spillway										
Crest Elevation	m.s.l.	617	544	512	547	476	470	476	488	xx
Bottom Width	feet	60	70	40	160	40	40	40	40	xx
Type		veg.	veg.	veg.	veg.	veg.	veg.	veg.	veg.	xx
Percent Chance of Use		4	4	4	2	4	4	4	4	xx
Ave. Curve No.-Cond. II		78	78	78	78	78	78	78	78	xx
Principal Spillway (Cap.)	c.f.s.	121	79	39	69	64	39	34	19	xx
Capacity Equivalents										
Sediment Volume	inch	0.87	0.73	1.15	0.75	0.64	0.85	0.67	0.69	xx
Water Supply Volume	inch	0.77	0.71	1.46	2.73	-	-	-	-	xx
Detention Volume	inch	6.36	6.42	6.48	7.40	6.44	6.48	6.50	6.53	xx
Spillway Storage	inch	3.00	2.89	5.91	4.62	3.92	8.00	5.33	4.48	xx
Class of Structure		a	a	a	b	a	a	a	a	xx

1/ 100-year sediment.

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Table A23 - Brazil Creek Structure Data
Poteau River Basin, in Oklahoma and Arkansas

Item	Unit	Site Numbers 1	2	3	4	5	Total
Location	Sec. T. R.	18-8N-25E	33-7N-22E	5-6N-22E	15-6N-21E	20-6N-21E	
Drainage Area	sq.mi.	16.80	5.39	16.57	12.29	6.78	57.83
Storage Capacity							
Sediment Pool	ac.ft.	242	132	389	295	163	1,221
Sed. in WS Pool	ac.ft.	-	-	-	-	-	-
Recreation Pool	ac.ft.	-	-	-	-	-	-
Municipal Pool	ac.ft.	-	-	-	-	-	-
Sed. in Det. Pool	ac.ft.	251	132	398	295	166	1,242
Detention Pool	ac.ft.	5,645	1,854	5,568	4,162	2,329	19,558
Total	ac.ft.	6,138	2,118	6,355	4,752	2,658	22,021
Surface Area							
Sediment Pool	acre	70	25	25	40	32	192
Recreation Pool	acre	-	-	-	-	-	-
Municipal Pool	acre	-	-	-	-	-	-
Detention Pool	acre	455	132	274	350	260	1,471
Embankment Data							
Elev. Top of Dam	m.s.l.	466	675	599	665	671	xx
Volume of Fill	1,000 c.y.	150	263	546	367	295	1,621
Maximum Height	feet	41	50	54	50	46	xx
Emergency Spillway							
Crest Elevation	m.s.l.	460	670	594	660	666	xx
Bottom Width	feet	75	40	100	130	95	xx
Type		veg.	veg.	veg.	veg.	veg.	xx
Percent Chance of Use		4	4	4	4	4	xx
Ave. Curve No.-Cond. II		78	78	78	78	78	xx
Principal Spillway (Cap.)	c.f.s.	168	54	166	123	68	xx
Capacity Equivalents							
Sediment Volume	inch	0.55	0.92	0.89	0.90	0.91	xx
Water Supply Volume	inch	-	-	-	-	-	xx
Detention Volume	inch	6.30	6.45	6.30	6.35	6.44	xx
Spillway Storage	inch	2.57	3.03	2.56	2.00	1.65	xx
Class of Structure		a	a	a	a	a	xx

Estimated Cost Summary - The estimated costs of the structural measures for the proposed U.S.D.A. projects possibilities including recreational and fish and wildlife facilities are shown in the following table:

Table A24 - Estimated Proposed Projects Installation Costs
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Federal Cost	Non-Federal Cost	Project Cost
Black Fork Creek	1,840,000	606,700	2,446,700
Combined Creeks	2,324,300	364,300	2,688,600
James Fork Creek	2,070,800	970,500	3,041,300
Brazil Creek	1,317,500	124,800	1,442,300
Total	7,552,600	2,066,300	9,618,900

Annual costs including operation and maintenance were estimated in table A25. The annual costs of recreational and fish and wildlife facilities are included. These costs are based on replacement of the facilities three times during the life of the project.

Table A25 - Annual Cost Proposed Projects
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Amortization of Installation Cost 1/	Operation and Maintenance Cost 2/	Total
Black Fork Creek			
Structures	72,783	1,200	73,983
Fish & WL Facilities	7,371	27,000	34,371
Subtotal	80,154	28,200	108,354
Combined Creeks			
Structures	84,311	2,300	86,611
Recreation Facilities	3,767	15,300	19,067
Subtotal	88,078	17,600	105,678
James Fork Creek			
Structures	91,312	3,900	95,212
Recreation Facilities	8,321	33,800	42,121
Subtotal	99,633	37,700	137,333
Brazil Creek			
Structures	47,250	750	48,000
Subtotal	47,250	750	48,000
Proposed Projects Total	315,115	84,250	399,365

1/ Price Base: 1965 prices amortized for 100 years at 3 1/8 percent.

2/ Long-term prices as projected by USDA, ARS-AMS, projections dated September 1957.

RECREATIONAL DATA

Site Data

Experience has shown that wherever water is impounded it will be used for recreational purposes regardless of whether it has been specifically planned for recreational use. In the past several years there has been increasing recreational use of reservoir waters. It is expected that recreational use will be made of the structures planned for municipal storage, the sediment pools of floodwater retarding structures as well as the fish and wildlife, and recreational structures. The following table furnishes an inventory of the recreational data for the reservoirs of all the upstream structures included in Public Law 566 work plans and planned as proposed projects.

Table A26 - Recreation Data For Watershed Structures
Poteau River Basin, in Oklahoma and Arkansas

Watershed	Surface	Storage	Shoreline
	(Acres)	(Ac. Ft.)	(Miles)
Upper Poteau	631	3,999	18.3
Black Fork	1,112	15,920	17.7
Fourche Maline	843	12,952	18.8
Caston-Mountain	206	2,076	7.7
Combined	544	4,220	11.1
James Fork	1,733	15,934	47.5
Brazil	192	1,221	4.7
Basin Total	5,261	56,322	125.8

State Parks

Robbers Cave State Park - A chief attraction of the park is the cave which was the hideout of many of the most notorious characters in western history. Included are Belle Starr, the Younger Brothers, the James Boys, and others. The park consists of 8,650 acres, mostly in pine forest. Two multipurpose structures are located within the park. Site 4, with a recreational lake of 33 acres has been constructed, and site 5, when built, will have a 94-acre fish and wildlife pool. The 52-acre Lake Carlton, also located in the park, furnishes fishing, swimming, boating, etc. Vacation cottages, cabins, camping facilities, picnicking, restaurant, grocery store, and trailer parks are a few of the vacation facilities offered at the park.

Nister State Park - The Division of Recreation and State Parks is developing and managing this park. The area is about 3,000 acres and is leased from the Corps of Engineers. The park area is mostly forest and furnishes a variety of facilities for vacation and holiday fun. These include picnic tables, fireplaces and a shelter, areas for outdoor camping, boat unloading ramps, a swimming beach, and overnight accommodations. There are stores for vacation supplies, a restaurant, and the area is served with hard-surfaced roads.

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Queen Wilhelmina State Park - Operated by Arkansas Parks and Publicity Commission is located on Rich Mountain. About 700 acres of the park are in the Poteau River Basin. The park is about 3,000 feet above sea level and is much cooler than the surrounding area during the summer months. One of the chief attractions is Queen Wilhelmina Inn, a historical structure originally built from sandstone in 1896 and restored within the past few years.

The State parks located in the Basin offer the following:

	Robbers State Park	Wister State Park	Queen Wilhelmina Park
Cottages	x	x	
Restaurant	x	x	x
Convention Hall			x
Hotel			x
Grocery Store	x	x	
Camping Facilities	x	x	x
Trailer Parking	x	x	x
Youth Camp	x		
Picnicking Facilities	x	x	x
Picnic Shelters	x	x	
Fishing	x	x	
Boat Rental	x	x	
Boat Ramps	x		
Swimming Beach	x	x	
Water Skiing		x	
Children's Playground	x	x	x
Cave	X		
Mountain Forest	x	x	x

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Talimena Trail

The Talimena Trail (original title, Skyline Drive) under construction in Arkansas and Oklahoma was for a number of years the expressed interest of public-minded individuals and organizations in both States. They early envisioned this route as an extraordinary scenic drive along 55 miles of the Ouachita National Forest mountains. Beginning at the city limits of Mena, Arkansas, the Trail would follow the tops of Rich Mountain and Winding Stair Mountain and terminate at U.S. Highway 271 six miles north of Talihina, Oklahoma. As early as 1954, and again in 1959, Congressional interest was shown for developing the Talimena Trail.

On November 5, 1961, through the efforts of Congressman Oran Harris of Arkansas, Forest Service Chief Richard E. McArdle met with a group of interested and responsible people from Arkansas and Oklahoma to discuss the possibility of early construction of this Talimena Scenic Drive. In attendance were Congressman Harris of Arkansas, Congressman Carl Albert of Oklahoma, Governor Faubus of Arkansas, a spokesman representing Senator Kerr of Oklahoma, members of Highway Commissions and Highway Departments of both States, Regional Forester Vessey, Supervisor Koen, and numerous local businessmen.

Largely through the efforts and interest of the late Senator Robert S. Kerr, financing of this Scenic Drive was reported out of the Public Works Committee of the Senate in September 1962. As a Public Lands Highway, the Talimena Trail was authorized by Public Law 87-866, The Federal-Aid Highway Act of 1962.

The Talimena Scenic Drive will extend for approximately 55 miles through the Ouachita National Forest along the crests of the highest of the Ouachita Mountains in Western Arkansas and Eastern Oklahoma. Its eastern terminus will be Mena, Arkansas, on U.S. Route 59-71 and State Routes 8 and 88. U.S. Route 59-71 running north and south forms a junction with U.S. 270-59 just four miles north of Mena, providing access from the east. Junction with U.S. Route 271 is its western terminus, seven miles northeast of Talihina, Oklahoma. Crossing the Talimena Trail at its approximate mid-point is Oklahoma State Route 103, connecting U.S. 270-59 four miles to the north with State Route 63 five miles south.

The 55-mile-course drive rises from an elevation of 1,150 feet at Mena to a maximum height of 2,681 feet, the highest point of Rich Mountain, and on to Wilhelmina State Park. State Route 272 drops from the mountain crest to U.S. 59-270 on the north from the State Park area. Continuing westerly along the meanders of the mountain top, past "rock slides" (extensive outcroppings of rock covering 3-4 acres and more in some instances) into Oklahoma, and down to the saddle at the west end of Rich Mountain to a potential recreation impoundment site.

From the low point of the saddle, the road grade continues in a northerly direction around Coon Mountain. The route continues westerly on the divide of the basins of the Arkansas River to the north, and the Red River on the south. Spur roads drop to the valleys, right and left, providing access to

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Wister State Park, Lake Wister, Cedar Lake, Billy Creek Recreation Area, Kiamichi River (renowned for fine sport fishing), Kiamichi Mountain vistas, and paved highways leading to popular Beaver's Bend State Park.

The western five miles of the Trail drops from the point on which is situated Sycamore Lookout Tower, across historic Military Trail (recalling such names as Robert E. Lee, Jefferson Davis, and other young military officers of America's historic western development who are reported to have gained experience along its winding alignment), and ending at U.S. Highway 271.

Throughout the length of the mountain top road location, the paralleling valley floors follow at varying levels averaging 1,500 feet below the roadway.

The slopes of the mountains present a great variety of plant life from young to ageless, and small to immense, of herbaceous and woody growth. The north slope of Rich Mountain in particular is well known for its great number of species of plants.

Almost limitless possibilities exist along the proposed locations for the development of forest recreation facilities of all kinds, as well as for providing better access and expanded use of those already in existence.

In addition, areas of historical interest dealing with the Indian era and subsequent pioneering will be shown.

DEFINITIONS AND REFERENCES

DEFINITIONS

Forest Land Class

Forest land - Includes: (a) land which is at least 10 percent stocked by trees of any size and capable of producing timber or other wood products or of exerting an influence on the climate or on the water regime; and (b) land from which the trees have been removed to less than 10 percent stocking and which has not been developed for other use.

Commercial forest land - Forest land which is (a) producing or physically capable of producing usable crops of wood, (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Commercial-reserved forest land - Forest land which otherwise qualifies as commercial forest land, but which has been withdrawn from timber utilization.

Forest Type

Shortleaf-loblolly pine - Forests in which 50 percent or more of the stand is of southern yellow pines. In the Poteau River Basin, shortleaf pine is the predominant pine species.

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Oak-pine - Forests in which 50 percent or more of the stand is hardwoods, usually oaks and hickory, and pines make up less than 25 percent of the stand.

Oak-gum-cypress - Bottomland forests in which hardwood species predominate, and pines make up less than 25 percent of the stand.

Class of Timber

Sawtimber trees - Softwoods 9.0 inches or larger in diameter at breast height, and hardwoods 11.0 inches or larger, that contain at least an 8-foot merchantable butt log and in which at least 50 percent of the gross sawlog volume is in merchantable logs. In softwoods, logs having a minimum small-end diameter of 6 inches are included; and in hardwoods, a minimum small-end diameter of 8 inches is used.

Poletimber trees - Softwoods 5.0 to 9.9 inches in diameter at breast height which are of good form and sound, and hardwood trees 5.0 to 10.9 inches.

Seedling and sapling trees - Trees of commercial species less than 5.0 inches in diameter at breast height and of good form and vigor.

Cull trees - Trees that are unmerchantable now or prospectively because of poor form, rot, or excessive limbiness.

Growing-stock trees - Sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live trees except cull trees.

Stand-size Class

Large sawtimber - Stands having a minimum net volume per acre of 1,500 board feet, International $\frac{1}{4}$-inch Rule, in sawtimber trees and half or more of this volume in trees 15.0 inches or larger in diameter at breast height.

Small sawtimber - Stands having a minimum set volume per acre of 1,500 board feet, International $\frac{1}{4}$-inch Rule, in sawtimber trees, but not meeting the specification for large sawtimber.

Poletimber - Stands with a 10 percent or greater stocking of poletimber and larger trees, with at least half the minimum stocking in poletimber trees, and not qualifying as sawtimber stands.

Seedling and sapling - Stands with a 10 percent or greater stocking of trees, with at least half the minimum stocking in seedling and sapling trees, and not qualifying as either poletimber or sawtimber stands.

Nonstocked and other areas - Commercial forest land not meeting any of the foregoing stand-size specifications.

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Volume

Board foot - Net volume of sawtimber trees in board feet by the International ¼-inch Rule.

Cords - Net cubic feet, inside bark, to a 4-inch minimum diameter, converted to cords using a factor of 75 cubic feet of wood per 4 x 4 x 8 foot standard cord of unpeeled wood.

Other Definitions

Farm ownership - Privately owned commercial forest land on farms in which the farm operator controls timber use. Where the farm operator does not control timber use, as under tenant or rental arrangements, forest land is classified as being in other private ownership.

Timber cut - Estimates represent inventory volume of trees cut and volume of any trees killed incidental to logging operations.

Timber growth - Estimates include both volume growth of existing measurable stand and volume of smaller trees moving to measurable size.

Stocking - Degree of stocking is the ratio of the number of trees in the stand to the number of trees required to fully occupy the site.

Canopy - The approximate amount of ground that is shaded by trees or shrubs 4 feet or more tall, in full leaf.

PROJECTION OF TIMBER SUPPLIES AND DEMANDS

National

According to the latest reappraisal of the national timber situation made by the U.S. Forest Service, (Timber Trends in the United States, Forest Service, U.S.D.A. February 1965, Forest Resource Report No. 17), the domestic demand for timber, after allowance for imports, is expected to increase by 30 percent by 1980, and 120 percent by the year 2000.

Demand for pulp and paper is expected to triple; plywood and veneer are expected to double; and lumber is expected to increase by more than 50 percent.

These estimates are based on a projected population rise from 187 million people in 1962 to 350 million in the year 2000, an increase of 87 percent.

The gross national product is expected to quadruple; and per-capita income and materials use are expected to double. Per-capita consumption of industrial wood is expected to rise by about 5 percent.

The projections of available timber supplies exceed projected demands until about 1990. Thereafter, projected demands are in excess of prospective supplies; and a need for raising present levels of forest management is seen.

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A part of the national demand for timber is expected to shift back to the eastern U.S., with continued cutting of the remaining original timber stands in the West. In the year 2000, it is anticipated that the South will provide half of the national timber cut, compared to 42 percent in 1962.

The timber cut in the South is expected to rise by about 40 percent by 1980, and by 40 percent by the year 2000. The regional timber inventory is expected to increase 51 percent by 1980, and to remain at approximately that level in the year 2000.

Poteau River Basin

In the Poteau Basin estimates are that both timber inventory and timber cut increases to 1980 and 2000 will be greater than in the South as a whole.

The sawtimber inventory is estimated to increase by 49 percent by 1980, by 89 percent at the year 2000 and 135 percent at 2020. Total growing stock, including sawtimber, is expected to increase by three-quarters by 1980, by more than 1½ times at the year 2000 and approximately 2 3/4 times at the year 2020.

The timber cut is estimated to more than double by 1980, to more than triple by the year 2000 and more than quadruple by 2020. These large relative increases are accounted for in large measure by a present low level of forest industry activity in the Oklahoma portion of the Basin, due to the small size of most of the pine and to low quality of more of the hardwood. Most of the timber cut increase estimated to 1980 is based on an expected resumption of pulpwood activity, with activity extending to the hardwoods as well as to the pine. There is presently some possibility of a pulp mill of 200 tons daily capacity locating within the Basin area. Such a mill would have an annual wood requirement of from 60,000 to 100,000 cords, depending on the pulping process used. It is also expected that pulp mills outside of the Basin area, including new capacity, will resume and increase their roundwood procurement in the Basin area. It is here estimated that round pulpwood procurement in the area will rise to 50,000 cords by 1980, and to 100,000 cords by the year 2000.

Estimates are that lumber production will rise from a present level of 28 million board feet to 30 million feet by 1980, and to 35 million feet by the year 2000. Larger mills in the area are expected to draw a larger proportion of their timber from within the area as the present stands of predominantly small trees develop to larger size.

It also bears mentioning that, with the substantial grouping of furniture and other secondary wood industries in nearby Fort Smith and Van Buren, there exists a potential outlet for a much larger production of hardwood lumber, if the hardwood forests within the Basin area should be built up and managed to supply it.

The production of posts, poles, and other products, as a group, is estimated to double by the year 2000.

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